Vol.1, No.1, April 2022, pp. 21~28

A MAGNETIC RESONANCE IMAGING (MRI) EXAMINATION OF THE KNEE JOINT TO ASSESS ITS INTERNAL DETERIORATION

MB. Arokiaraj, B. James, DR. Gunasekaran*
Sri Balaji Medical College and Hospital, Chromepet, Chennai - 600 044, India

Article Info

Article history:

Received Feb 20th, 2022
Revised March 21th, 2022
Accepted April 4th, 2022

Keyword:

Orthopaedics
Radiology
Post-operation
Side effects

ABSTRACT

The present study is a prospective study carried out in Department of Orthopaedics, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry. 22 patients with displaced intra-articular calcaneal fractures were selected based on the proposed inclusion and exclusion criteria. All these patients are assessed clinically and radiological, classified under Sander"s system and were subjected to percutaneous fixation using Steinmann pin, kirschner wire and cannulated cancellous screws. Post operatively all the patients were assessed clinically, radiologically and the results were analysed in detail. In our study 11 out 22 patients (50%) reported to the hospital within 1 day and 1 patient (4.5%) at a maximum of 4 days after injury with a mean of 1.83 ± 0.8..

Corresponding Author:

Dr. G. Jayalakshmi,
Sri Lakshmi Narayana Institute of Medical Sciences,
Kudupakkam Post,
Puducherry - 605 502, India.
Email: jayalakshmi.2k15@gmail.com

How to Cite:

Arokiaraj *et. al.* A magnetic resonance imaging (MRI) examination of the knee joint to assess its internal deterioration. IJBTCM. 2022; Volume 1 (Issue 1): Page 21-28.

1. INTRODUCTION

Calcaneum is the largest weight bearing bone of the foot aiding in normal ambulation Fracture of the calcaneum is the most common tarsal injury accounting almost 65%. On the whole it constitutes almost 2% of all the fractures occurring in both sexes majority being the male between 21 to 45 years of age [1]. Fracture of calcaneum occurs as a result of high energy trauma and the most common modality being Fall from height and by other means such as Road traffic accidents. Patients reported with calcaneum fracture are those industrial and construction workers thus impairing the socio economic stability as they are the sole earning member of the family. As the word Fracture suggests, the change in bone structural pattern, disruption of articular relationship remains challenging for a satisfactory reduction, preventing disability and achieving early restoration of well being [2].

Based on mode and severity of injury, calcaneal fractures are presented as extra- articular and intra-articular. 65% -75% of fractures are displaced intra-articular warranting active participation by means of anatomical reduction and stabilization. Management of calcaneal fractures remains debatable especial when it comes to the type of modality to choose in terms of conservative or surgical –open or closed percutaneous and maintaining the reduction by splinting [3]. Being a cancellous bone the focus is made not only to re-align the fracture segment but also to re -establish subtalar joint congruency and restoration of movements which is the primary load bearing joint of the foot [4].

2. METHOD

The current study is a prospective study conducted at SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES' Department of Orthopaedics. The data for this study came from patients who visited and were hospitalised to the Department of Orthopaedics with calcaneal intra-articular fractures. The study included 22 cases of either gender. Told written consent was obtained when patients were fully informed about the trial. The research took place from August 2020 to September 2021. The follow-up duration ranged from 6 months to a year. The outcomes of 22 fractures in 22 patients were examined and assessed. The data was evaluated and compared to comparable series in the literature..

2.1. Inclusion parameters

1. Both male and female
2. Closed fractures
3. Intra-articular calcaneal fractures
4. Patient who are fit for surgery.

2.2. Exclusion parameters

1. Open fractures
2. Patients with diabetic foot ulcers or any other infected wound around the heel.
3. Undisplaced fracture calcaneum.
4. Patients not giving written consent for surgery..

2.3. Data collection

All calcaneal fractures were classified and assigned to particular group based on Essex-Lopresti‟s and Sanders classification system. The preferred system used in ur study is Sanders classification. The study included 22 cases treated by percutaneous techniques using kirschner wire, steinmann pin and cannulated cancellous screws. Bohler angle and calcaneal height was calculated and compared both pre and post operatively. The basic aim of the surgery was to maintain and restore as near anatomical architecture and subtalar joint congruity as possible.

2.4. Radiographic investigation

Xray: Antero-Posterior, Lateral and Harris axial views: to view the fracture morphology and pattern CT scan: To view the fracture extent, intra-articular extension, surgical planning with application of Sander‟s classification.

2.5. Preparation for surgery

After the injury patient is taken up for surgery in an average of 3-4 days duration. Operation was planned according to type of fracture, whether displaced or undisplaced, severity of comminution, skin status (blisters), & status of edema. According to the fracture pattern reduction manoeuvre using steinmann pin, kirschner wire and fixation techniques using cannulated cancellous screw were planned. Edema is made to subside by bed rest, limb elevation, below knee slab immobilistion & anti-inflammatory drugs.

2.6. Post-operative period

Patient was maintained in a below knee plaster of paris slab immobilisation with limb elevation on two pillows. Adequate analgesics, anti-inflammatory, i.v antibiotics along with calcium and vitamin supplementation were started and continued. Non weight bearing ambulation with walker support was advised and encouraged along with active knee range of motion exercises and active toe movements. Wound inspection with cleaning and dressing was done at regular intervals. Below knee slab was maintained for 6 weeks.

2.7. Follow up

Patients were assessed both clinically and radiologically at regular intervals of about 4,8 and 12 weeks and noticed for radiological evidence of union and were followed up for a period of 6 months to 1 year. The results were assessed according to :

1. American Orthopaedic Foot and Ankle Society scoring system.
2. Status of radiological union.
3. Pre Bohler and post Bohler angle measurements.
4. Pre and post calcaneal height
5. Evidence of any complication..

3. RESULTS

From our study sample of 22 patients, 7 patients were between 26-35 years of age (31.8%) followed by 6 patients between 36-45 years of age(27.3%), mean age being 36.5 ± 12.3.

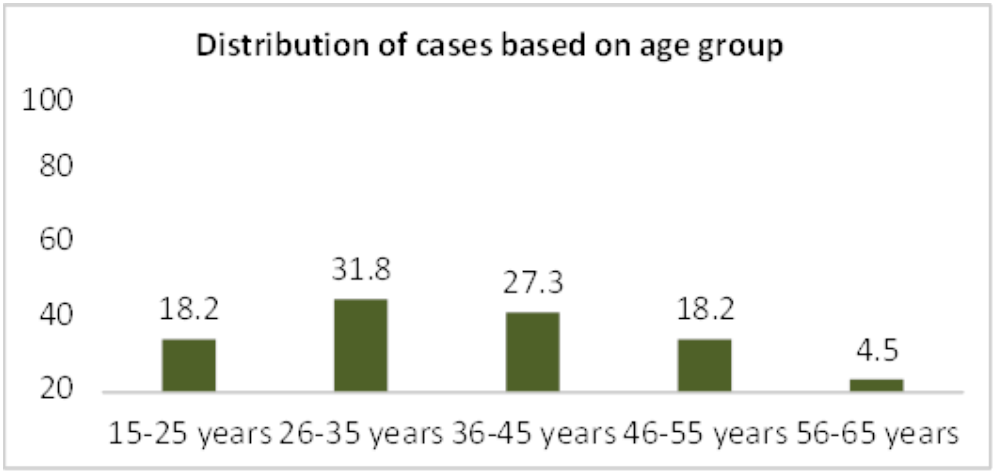

Figure 1. Age distribution

In our study 17 patients were males (77.3%) and 5 patients were females(22.7%) showing male preponderance (M:F:: 3.5:1).

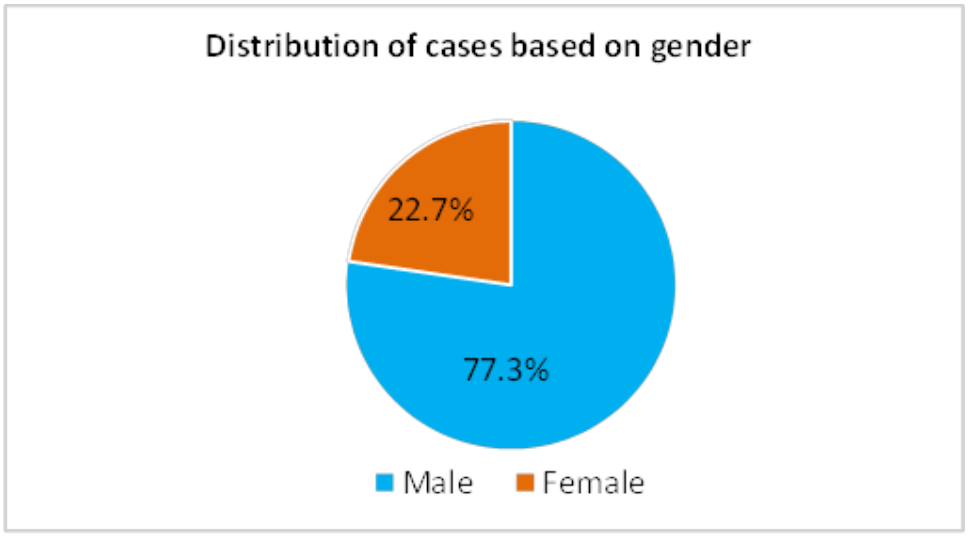

Figure 2. Gender distribution

18 patients (81.8%) gave history of fall from height and 4 patients (18.2%) were involved in road traffic accidents.

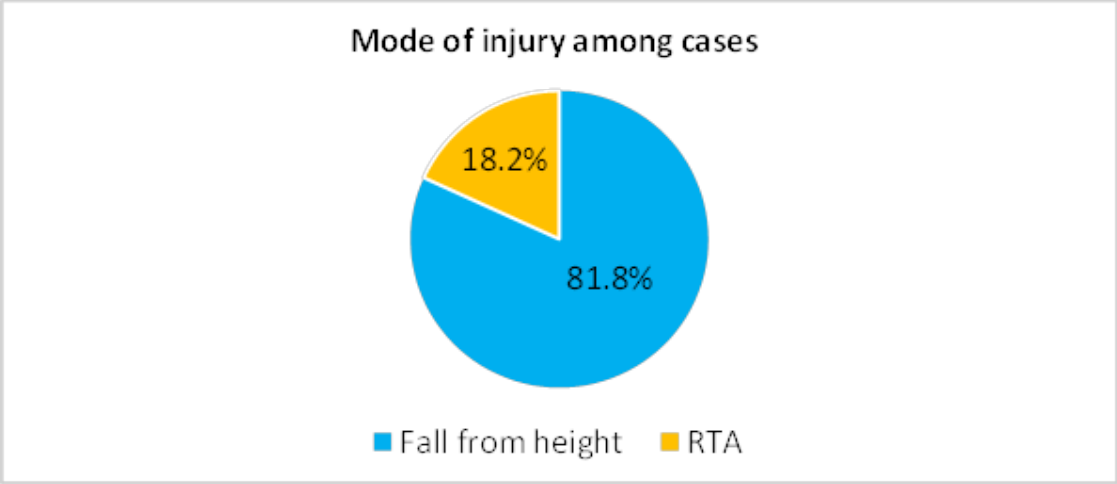

Figure 3. Mode of injury

17 patients (77.27%) had involvement of right foot and 5 patients (22.72%) had involvement of left foot. There were no patients with bilateral calcaneal fractures in this study.

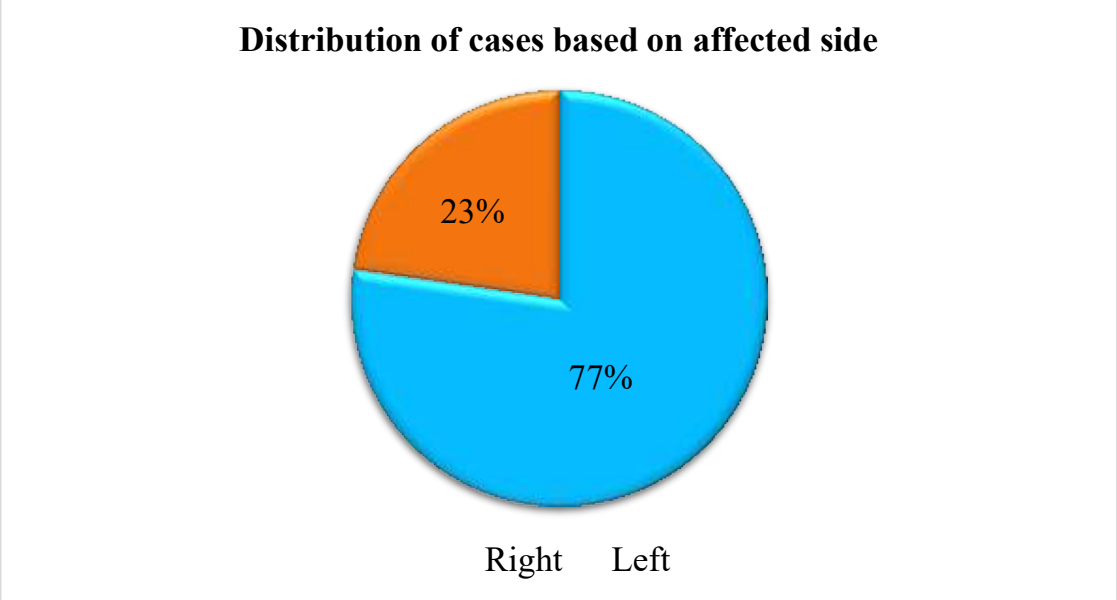

Figure 4. Affected side

In our study 11 out 22 patients (50%) reported to the hospital within 1 day and 1 patient (4.5%) at a maximum of 4 days after injury with a mean of 1.83 ± 0.8.

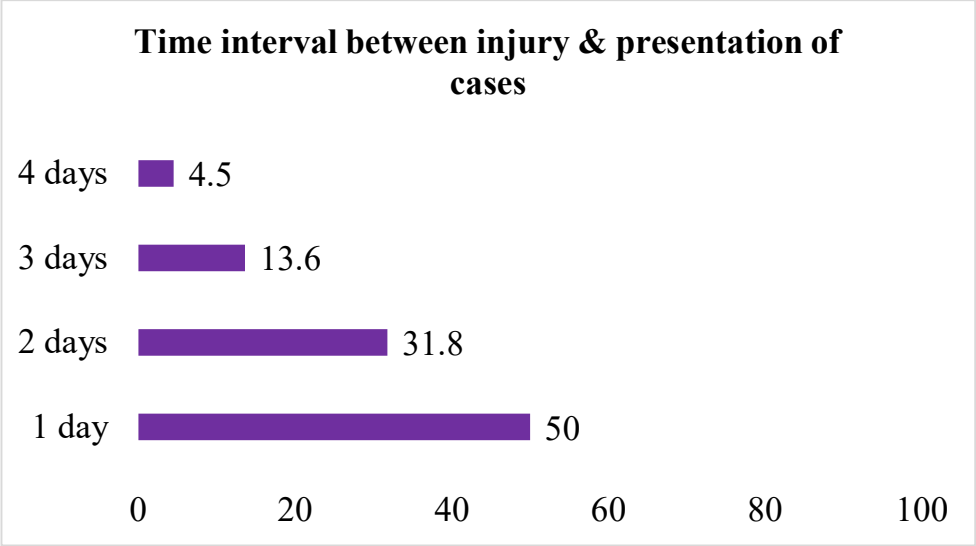

Figure 5. Time duration between injury and presentation.

6 patients (22.7%) had external injuries as abrasions around the foot and ankle at the time of injury and there was no any other associated injuries for the patients in our study.

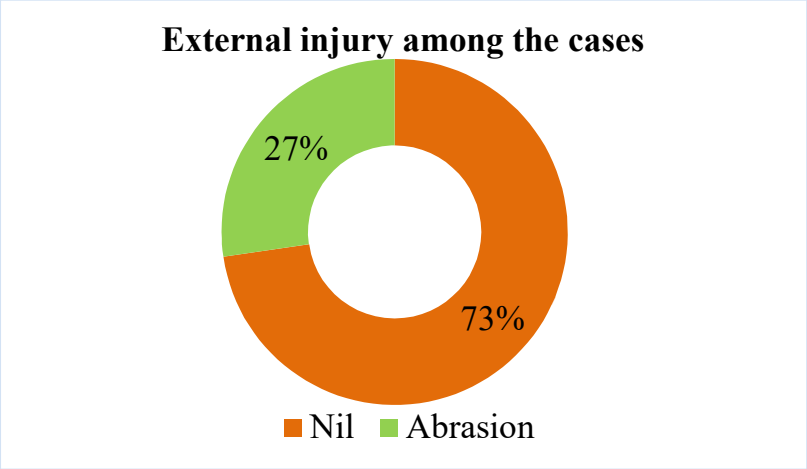

Figure 6. External injuries

In our study all the patients are classified Sander"s classification system, 10 patients (45.5%) were grouped under type III followed by 8 patients (36.4%) were grouped under type II.

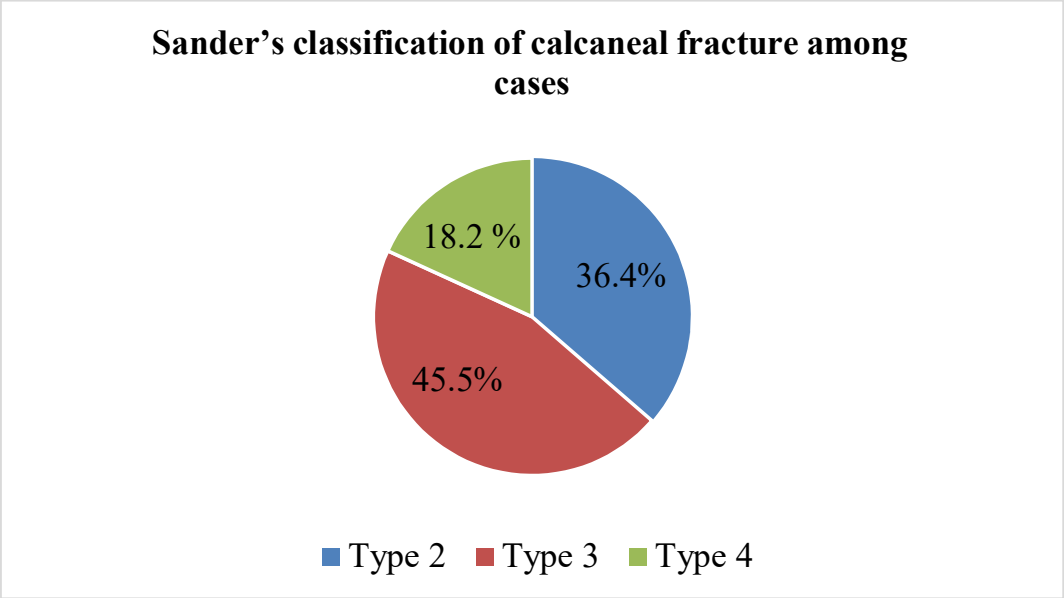

Figure 7. Sander's classification

In our study 19 patients (86.4%) had pre op Bohler"s angle ranging between 15-20 degrees and the remaining 3 patients(13.6%) had the angle less than 15 degrees. The mean pre op Bohler"s was 17.41± 2.17.

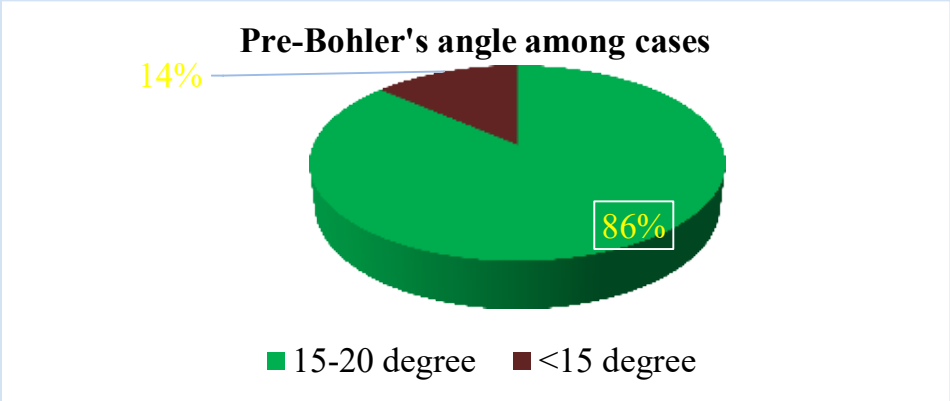

Figure 8. Bohler's angle

4. DISCUSSION

Fracture of the calcaneum is the most common tarsal injury accounting almost 65%.On the whole it constitutes almost 2% of all the fractures occurring in both sexes majority being the male between 21 to 45 years of age [5-12]. Fracture of calcaneum occurs as a result of high energy trauma and the most common modality being Fall from height and by other means such as Road traffic accidents. Patients reported with calcaneum fracture are those industrial and construction workers thus impairing the socio economic stability as they are the sole earning member of the family [13-18].

In our study the key feature was restoration of anatomical architecture of the calcaneum by percutaneous techniques using steinmann pin, kirschner wires and cannulated cancellous screws, preventing soft

tissue dissection and damage, prevention of infection and promoting early motion with restoration of daily activites [18-20].

A study on 125 intra articular fractures ,was divided into two groups subjected to both open reduction and internal fixation (42 fractures) through extended lateral approach fixed with plate and screws and the other group had percutaneous fixation(83 fractures) using kirsckner wires and cannulated cancellous screws. He concluded that percutaneous reduction and fixation minimised the complications compared to open reduction [21-23]. In our study all the operated patients (22 patients) were analysed clinically in terms of their functional outcome to carry out their daily routine activities, early resume to work and activities of leisure. A standard scoring system American Orthopaedic Foot and Ankle society (AOFAS) hindfoot score was used for assessing the functional outcome.

5. CONCLUSION

In our study, 22 patients with displaced intra-articular calcaneal fractures were selected based on the inclusion and exclusion criteria as proposed and were all subjected to surgical management by means of percutaneous technique using steinmann pin, kirschner wire and cannulated cancellous screws. By this percutaneous technique the articular congruity, length, pitch of the calcaneum and the angles(Bohler‟s and Gissane) were restored favouring the functional outcome and preventing excessive complications. In our study 18 patients (81.8%) showed good to excellent outcome after being subjected to standard scoring system AOFAS in terms of daily routine activities and patients well being thereby promoting percutaneous fixation of displaced intra-articular calcaneal fractures as a superior mode of management with minimal post op complications.

ACKNOWLEDGEMENTS

The encouragement and support from Bharath University, Chennai is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

FUNDING

Nil

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

COMPETING INTEREST

The authors declare no conflict of interest.

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