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Comparative Study of Conservative vs Surgical Management of Closed Calcaneal Fractures

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ABSTRACT

Background: Calcaneal fractures are about 2-3% of all fractures, caused most by fall from height. More common in younger people. The treatment of calcaneal fracture is controversial. It may be surgical or conservative. A prospective study was conducted to compare operative and non-operative treatment for closed calcaneal fractures. To study the union of calcaneal fractures both clinically and radiological attaining correct Bohler's angle and union.

Methods: Patients were routinely monitored for a year after being divided into two groups according to the type of treatment received (nonoperative and operative). The American Orthopaedic Foot and Ankle Society (AOFAS) scale and the Maryland Foot Score were used to evaluate the outcome measures. After a year, the patient's work-related results were recorded and contrasted with their pre-injury state. The study included 50 individuals with 50 calcaneal fractures. Twenty-five patients received conservative treatment and twenty-five underwent surgery.

Results: Using two outcome score systems (AOFAS-mean 81.4, MFS mean 79.1), two of the 25 operated cases had excellent outcomes, twenty had acceptable outcomes, two had fair outcomes, and one had bad outcomes. Out of 25 cases managed nonoperatively, 1 case showed excellent outcome, 15 cases showed good outcome, 8 cases showed fair results and one case showed poor outcome with AOFAS score (AOFAS mean 74.6 and MFS mean 75.9).

Conclusion: Compared to non-operated instances, operated cases had a better overall result. After a year, the results of surgical therapy for closed calcaneal fractures are favorable. Both treatment groups experienced complications.

Key-words: Calcaneal fractures, Intra-articular fractures, AOFAS score, MFS score, Surgical Management

INTRODUCTION

About 1% to 2% of all fractures in the human body are calcaneal fractures, which are the most frequent tarsal bone fractures [1]. These fractures are intra-articular in about 75% of cases [2].

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A fall from a height when one or both heels strike the ground directly is typically the cause of intra-articular fractures [2-5]. According to several studies, patients who received surgery reported lower levels of discomfort and better functional outcome scores than those who did not get surgery [6,7].

Numerous complications and guarded outcomes are linked to these fractures, which can have serious long-term effects on quality of life. Patients with various orthopedic disorders have better results than those with calcaneal fractures. Variable fracture patterns are caused by very little soft tissue coverings and very little dense cortical bone, which makes treating calcaneal

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fractures extremely challenging. Patients should be made aware of the injury's potential to change their lives, particularly if they have a job that needs them to stand a lot and the length of time it will take to recover.
The indications for surgical treatment of calcaneal fractures are not universally agreed upon. Based on the available data, numerous authors concur that displaced intra-articular calcaneal fractures with joint displacement of 2 mm or more should be reduced anatomically to prevent excruciating hindfoot deformities and posttraumatic arthritis of the subtalar joint, provided there are no systemic or local contraindications [8,9]. Comparing the clinical results of closed calcaneal fractures treated conservatively and surgically was the goal of our investigation.

MATERIALS AND METHODS

Place of study- A prospective study was conducted on 50 patients with closed calcaneal fractures, aged between 18 and 60 years in our Government Medical College, Nizamabad from April 2022 to October 2023.

Inclusion criteria- patients between 18 and 60 years, all genders with closed calcaneal fractures.

Exclusion criteria

Patients with open fractures,
Associated spine fractures with neurological deficits,
Diabetes and chronic diseases (Liver and kidney) were excluded from the study.
Informed and written consent was taken from all patients.
50 patients with calcaneal fractures were studied. Patients were assigned to two groups.

(Twenty-five non-surgical patients and 25 operative cases). Based on alternate allocation, randomization was carried out. Every patient had an X-ray taken. The Essex Lopresti classification was used to categorize the fractures. Preventing soft-tissue problems requires thorough preoperative planning and appropriate timing [10]. Ten lateral radiographs are utilized to evaluate the posterior facet's rotation and height loss (loss of Böhler's angle). The axial (or Harris) view is used to evaluate the heel's breadth and the tuberosity's varus location.

A below-knee cast and non-weight-bearing crutch walking was used as a non-operative treatment for six weeks. The cast was taken off and radiographs were collected six weeks later. According to their pain threshold, patients were progressively mobilized with partial weight-bearing based on X-ray features, and after four months, full weight-bearing was initiated.

One of these techniques was used for the surgical treatment:
1) Percutaneous reduction and fixation using cannulated cancellous screws.
2) Internal fixation using plates and open reduction.

Twelve instances underwent percutaneous c-screw fixation, whereas thirteen cases underwent plating as part of the surgical treatment. Splints with non-weight-bearing mobilization were placed on patients treated by the surgical procedure for a maximum of four weeks. Active ankle and toe mobilization began between weeks four and ten. With strengthening exercises, gradual partial weight bearing was permitted starting at week ten, and full weight bearing was permitted at week twelve. The patients were monitored for at least a year. We employed the American Orthopaedic Foot and Ankle Society Score (AOFAS) [11] and the Maryland Foot Score as outcome measures. Operational and conservative groups' outcomes were contrasted. At the one-year follow-up, the patient's occupation-related result was identified.

Statistical Analysis- Complications of treated calcaneal fractures were examined using statistical analysis. The T-test was used for statistical analysis once the data was loaded into an MS Excel spreadsheet. A p-value of less than 0.05 was deemed significant.

RESULTS

Out of the 50 patients in our study, 48 were men and 2 were women. The patients were between the ages of 18 and 60. Of these, 22 patients had left-side fractures and 28 patients had right-side fractures. Most fractures resulted from falls from a height, followed by electric shock in two cases, RTA in two cases, and a large object falling on the foot in one case. Six patients were truck drivers, two were electricians, four were plumbers, four were students, and thirty-four were manual laborers. Twenty-five instances were operated on, and twenty-five cases were conservatively handled. Two of these 25 operated patients had great results, twenty had good

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results, two had fair results, one had terrible results with an AOFAS score, and twenty had good results with an MFS score in one year. Fifteen of the non-operated patients had good results, one had excellent results, eight had acceptable results, and one had poor results with the AOFAS score; two had excellent results, sixteen had good results, six had fair results, and one had terrible results with the MFS score during the one-year follow-up.

Table 1: Fractures classified based on Essex Lopresti Classification

Types	Operative	Non-operative	Total
Tongue type	13	13	26
Joint depression	12	12	24
Total	25	25	50

Table 2: Outcome related to occupation of patients at 1 year follow up

Outcome related to patient occupation	Operative	Non-operative
No difficulty	18	16
Mild difficulty but able to perform normal duties	3	6
Moderate to severe difficulty leading to change of	3	1
Unable to work	2	1

Table 3: Comparison between operated group and non-operated group at 1 year follow up

Score	Treatment	Number	Mean	p-value
AOFAS 1 year	Operative	25	81.4	0.03
	Non operative	25	74.6	0.01
MFS 1 year	Operative	25	79.1	0.03
	Non-operative	25	75.9	0.04

Table 4: Complications

Complication	Number	Operative	Non- operative
Ankle stiffness	36	22	14
Heel pain	34	14	20
Wound infection	2	2	0
Wound dehiscence	1	1	0
Plaster sores	4	0	4
Osteomyelitis	1	0	1

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1a: Pre OP x-ray

1b: Post op with CC screws

1c: Post of physiotherapy

1d: Pre OP

1e: Post OP with plating

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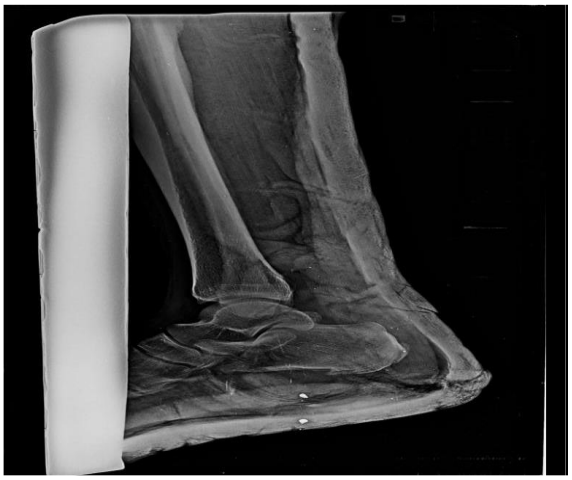
1f: Clinical pictures

1g: Pre OP

1h: Post OP with plating

1i: Clinical picture



1j: Conservative management

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1j: Initial Xray **1l:** Follow up Xray

Fig. 1: Surgical management

DISCUSSION

The outcomes of nonoperative versus surgical treatment are still hotly debated. Comparing studies that have assessed results has been challenging due to the absence of findings uniformity. There is a lack of agreement despite the large number of reported studies. According to certain research, non-operative management produces better results. Several authors have looked into operative management and found positive outcomes [12,13].

When Algren *et al.* [14] compared conservative and surgical management in 2013, the results at one year did not show a statistically significant difference. However, in a post-hoc examination of their findings (published in 2014), Agren *et al.* [14] discovered that the subgroup of patients receiving surgical care had noticeably superior outcomes. Our study's findings on conservative management were mediocre. Our study's surgically managed case outcomes are similar to those of the De Boer *et al.* [6] study. Patients with diabetes mellitus, peripheral vascular disease, high body mass index, smoking, drinking, delayed presentation, and fracture blisters have all been linked to poor results from surgical therapy.

Leung *et al.* [15] investigated the medium-term outcomes of surgical therapy for displaced intra-articular calcaneal fractures. The group that underwent surgery showed noticeably superior outcomes in terms of hindfoot swelling, activity, range of motion, pain, and return to work.

Both therapy approaches were shown to have problems. The most frequent side effects in both groups were irregularities of gait, heel discomfort, and stiffness. Plaster sores and wound infections were among the other problems that were exclusive to the conservative and surgical groups, respectively. [16]. The only effective treatment for foot compartment syndrome, a dangerous side effect of calcaneal fractures, is an immediate fasciotomy.

CONCLUSIONS

Operative treatment of closed calcaneal fractures showed good results in the one-year follow-up study. Non-operative treatment gave fair results. Complications were seen both with operative and non-operative treatment. Minimally invasive operative techniques showed better clinical results and fewer complications. Wound problems are unavoidable even with advancements in surgical treatment for calcaneal fractures. Better postoperative care, extensive anatomical knowledge, less invasive surgical techniques, and surgical expertise should all be guaranteed.

CONTRIBUTION OF AUTHORS

Research concept- Gavaskar B, Ramesh Kothuru
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