

Original Article

Surgical Management Of Displaced Intra Articular Calcaneal Fractures By Various Methods : A Prospective Study

Dr Jhath Venkateswaralu¹, Dr Jhath Dhoom Singh², Dr T.Venkateshwar Rao³, Dr Amara Vedavani⁴

Abstract

Introduction : Treating Calcaneal fractures is a challenge. Various procedures both surgical and nonsurgical were described. This study was taken up to know the merits of surgical management of Calcaneal fractures.

Methods: 28 intra articular fractures have been classified as per ESSEX LOPRESETTI as joint depression and tongue type. 11 fractures were treated with open reduction and internal fixation with calcaneal plates. 6 were treated with recon plates, 11 fractures were treated with percutaneous screw fixation. Cases included in the study were displaced intra articular fractures. Functional outcome was assessed using Creighton Nebraska scoring after following the cases for over a mean period of 24 months. Study period was 2 years i.e., from Jan 2014 to Jan 2016

INCLUSION CRITERIA : 1. Age about 20 years of age. 2. Simple/closed fractures. 3. Calcaneum fractures associated with or without spine injuries without neurological deficits.

EXCLUSION CRITERIA : 1. Patients having associated lower end of tibia and fibula fracture involving ankle mortise. 2. Extra-articular calcaneal fractures

Results: In surgically managed 28 cases 12 cases had excellent, 11 cases good, 3 cases fair and 2 cases poor outcomes. In 11 cases fixed with calcaneal plates 6 had excellent outcome. In 6 cases with recon plates 2 had excellent results. In percutaneous fixed cases with cc screws with washers 6 cases had excellent outcome.

Conclusion: Open reduction and internal fixation with plating has to consider for achieving excellent functional outcome. Percutaneous screw fixation can also be considered which yields good functional outcome and less post operative complications.

Key words : calcaneal fractures, intra-articular, plating, screws, Essex lopresetti, CN score.

Introduction

Calcaneum fractures account for 2% of all fractures, 60% of tarsal bone fractures. 10% of fractures are bilateral and 75% are intra articular. 10% of fractures are associated with vertebral fractures. Mechanism of injury in majority of patients is axial loading i.e. fall from height. Other mechanisms are brake pedal injuries and high velocity trauma. Treating calcaneum fractures is a challenge for orthopedic surgeon. Treatment options ranges from non

operative to operative methods^{4,8,13}. Some studies advocate internal fixation whereas some show no differences^{6,14}. Hence, a study has been conducted to know the merits of surgical fixation of calcaneum fractures

Materials and Methods

There were 28 intra articular fractures in 24 patients treated in study period which was 2 years i.e., from Jan 2014 to Jan 2016. Mean patient age was 31.7 years 20 patients were males (83.33%) and 4 were females (16.67%). Right Calcaneum was involved in 6 cases (25%), Left Calcaneal fracture was seen in 14 cases (58.33%), 4 cases (16.67%) had bilateral calcaneum fractures. Mechanism of injury was fall from height in all patients. 2 patients (8.4%) had associated vertebra fractures without neurological deficit. Patients were evaluated clinically and imaging. X-Rays AP, Harris axial, lateral views of calcaneum were taken. In few cases CT scan was done to know the fracture anatomy. 28 intra articular fractures (56%) were fixed internally or percutaneously under fluoroscopic guidance on an average in 11 days of injury, once wrinkle sign is

Author: ¹ MS, ORTHO, Associate Professor, Dept. of Orthopedics, MGM Hospital, Kakatiya Medical College, Warangal. TELANGANA.

Author : ²MS, ORTHO, Consultant Orthopaedic Surgeon, Nirmal Sai Hospital, Hanmakonda, Warangal, Telangana.

Author : ³ MS ORTHO, Professor & HOD. Dept. of Orthopedics, MGM Hospital, Kakatiya Medical College, Warangal.

Author : ⁴Post graduate, Dept.of Orthopedics, Kakatiya Medical College, MGM Hospital Warangal.

positive. The aim of treatment was to achieve articular surface congruity, to restore height, and width of axis of heel. In surgically treated fractures, percutaneous screw fixation done for 11 intra articular fractures and open reduction and internal fixation with locking plates was done in 11, open reduction and internal fixation with recon plates was done in 6 cases, Extensile lateral approach (Seligson approach) was followed to fix the fracture with calcaneal plates or recon plates¹³. Axial and Borden views were assessed under fluoroscopy intraoperatively. Satisfactory reduction was achieved in all cases. For comparison of corrected Bohler, post operative radiographs were taken. Postoperatively limb elevation was maintained for 72 hours. Compressive bandage was applied over sterile dressing. Complete suture removal was done at an average of 14 days. All operated patients were kept on absolute non weight bearing for 4 weeks followed by touchdown weight bearing with active and passive movements of ankle and sub talar joints. Full weight bearing was allowed from 12 weeks. Regular clinical follow up examination was performed monthly in all cases and functional outcome was assessed by using Creighton Nebraska scoring system after following the cases over a mean period of 24 months.

RESULTS

There were 28 intra articular fractures in 24 patients in 2 years which were treated. Among 28 cases, percutaneous screw fixation was done for 11 intra articular fractures (39.29%) and open reduction and internal fixation with locking plate in 11 intra articular fractures (39.26%), open reduction and internal fixation in 6 cases (21.43%) by recon plates. Mean patients age was 31.7 years. 20 patients were males (83.33%) and 4 cases (16.67%) were females. Right calcaneum was involved in 6 cases (25%) 14 cases (58.33%) had left calcaneum fracture, 4 cases (16.67%) had bilateral calcaneum fractures. Essex Lopresetti classification was used to classify fractures, joint depression and tongue type. Among 28 fractures 16 (57.14%) were joint depression type, 12 (42.86%) were tongue type. Creighton Nebraska scoring system was used to grade the outcomes at average follow up of 24 months. Among 28 cases, 11 cases (39.29%) fixed with calcaneal plates 6 had excellent (21.43%), 2 good (7.14%), 2 fair (7.14%), 1 poor (3.58%). Among 6 cases (21.43%) fixed with recon plates 2 had excellent (7.14%), 3 good (10.72%), and 1 case poor (3.58%) results. Among 28

cases 11 cases (39.29%) fixed percutaneously with cc screws with washers 4 had excellent (14.28%), 6 good (21.43%), and in 1 fair (3.58%) results were obtained (Table 1). Preoperative Bohlers angle mean was 13.93 degrees, postoperative mean was 22.37 degrees, and improvement achieved was 8.44 degrees.

Table 1 : Type of correction and results obtained

TYPE OF CORRECTION	CASES	EXCELLENT	GOOD	FAIR	POOR
CALCANEAL	11 (39.29%)	6 (21.43%)	2 (7.14%)	2 (7.14%)	1 (3.58%)
CC SCREWS	11 (39.29%)	4 (14.28%)	6 (21.43%)	1 (3.58%)	- Nil
RECON PLATES	6 (21.43%)	2 (7.14%)	3 (10.72%)	- Nil	1 (3.58%)
TOTAL	28 (100%)	12 (42.85%)	11 (39.29%)	3 (10.72%)	2 (7.16%)

Creighton Nebraska's scoring system 90-100

Excellent, 80-89: Good, 65 – 79: Fair, < = 64,: Poor

Table 2 : Comparison with other studies

SERIES	YEAR	CASES	EXCELLENT	GOOD	FAIR	POOR
ROWE	1963	31	12.9%	51.6%	29%	6.5%
SANDERS	1992	120	25%	40.8%	10.8%	23.3%
ZWIPP	1992	90	16.4%	44.7%	32.4%	6.5%
KANAKARNE	1998	25	32%	20%	20%	28%
RICHARD	2002	20	37.5%	25%	12.5%	25%
MALLIKARJUN	2014	30	40%	40%	20%	0%
J.V. et al	2015	28	42.85%	39.28%	10.72%	7.14%

In one case fixed with recon plate subtalar arthritis and peroneal tendinitis occurred. 3 cases among 11 cases fixed with calcaneal plate had wound dehiscence which healed with systemic antibiotics and debridement, 3 cases had peroneal tendinitis which responded well to analgesics and hot fomentation. 11 cases fixed percutaneously had no significant complications, 2 cases had ankle pain.

DISCUSSION

Intra articular fractures account for approximately 75% of calcaneal fractures¹, and are commonly associated with other axial load injuries giving rise to lumbar vertebral fractures. Mechanism of injury of the calcaneum fracture causes a major soft tissue injury that includes heel pad, skin and other soft tissues. Lateral, axial and Broden view radiographs are used to examine calcaneal fractures. Essex lopresetti classification was used to classify the fracture pattern.

The treatment goals are:

- 1 Restoration of congruency of the posterior facet of subtalar joint,

Our study showed excellent outcomes with fixation of calcaneal plates and also percutaneously fixation with cc screws with washers. Comparing to CC screws 20 and recon plate fixation, calcaneal plates are better to restore joint congruity and correct the Bohlers angle as joint surface is visualized.

CONCLUSION

In displaced intraarticular calcaneal fractures the aim of treatment should be anatomical reduction and restoration of Bohlers angle. Surgery is perhaps the solution to achieve the goal.

Post treatment Bohlers angle has prognostic importance on functional outcome

Extensile L-shaped approach is associated with minimal post operative wound complications, better visualization of subtalar joint and wide space for lateral plates fixation. Delaying surgical intervention for more than 2 weeks following injury can be associated with difficulties in Intraoperative fracture reduction.

Hence it can be concluded that open reduction and internal fixation with either calcaneal plates or recon plate depending on space available can be considered for closed displaced intra-articular fractures of calcaneum.

Cc screws better to use in minimally displaced intra articular fractures having less deranged Bohlers angle.

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