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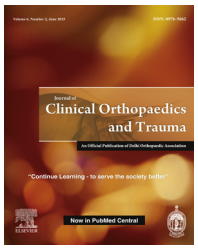

Original Article

Evaluation of functional outcome and complications of locking calcaneum plate for fracture calcaneum

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ABSTRACT

Background: Open reduction and internal fixation (ORIF) is the treatment of choice for displaced intra-articular calcaneal fracture at many orthopaedic trauma centres. In this prospective study, we evaluated the functional outcome and complications of locking compressive calcaneum plate for displaced intra-articular fracture calcaneum.

Methods: Between October 2011 and March 2012, 30 patients with displaced intra-articular fracture calcaneum attending the outdoor and emergency of our institute were included in the study. All the included patients were operated using standard lateral approach and followed up to 1 year.

Results: Of 30 patients, 14 (48%) patients were Sander's type II, 10 (33%) were type III, and 6 (20%) were type IV. All the patients were evaluated post-operatively. Articular surface of posterior facet of calcaneum and crucial angle of Gissane was maintained in all patients. Four patients had post-operative Boehler's angle $<20^{\circ}$ and 26 patients had between 21° and 40°. All the patients having post-operative Boehler's angle $<20^{\circ}$ were type IV as compared to types II and III (statistically significant). Ninety-six percentage of patients having post-operative Boehler's angle 21–40° were more satisfied at 1 year as compared to 25% of patients having post-operative Boehler's angle $<20^{\circ}$ (statistically significant). Complications were present in 6 (20%) patients.

Conclusion: ORIF with locking compressive plate in displaced intra-articular fracture calcaneum gives good outcome. Results are more favourable in less comminuted as compared to more comminuted. Maintenance of Boehler's angle is also necessary for satisfactory results along with maintenance of articular congruence of posterior facet of calcaneum and crucial angle of Gissane.

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1. Introduction

Calcaneal fracture is comparatively a rare injury, with reported occurrence of 2% of all fractures. The intra-articular type constitutes 75% of calcaneal fracture.[1–3] These fractures occur due to axial force in the axis of crus due to vertical fall from height when processus lateralis tali impacts as a hammer on the area of Gissane's vertex and then breaks through the posterior articular facet. The functional outcome of foot after such a fracture is poor.[1–3]

Controversy remains with respect to whether displaced intra-articular calcaneal fracture ought to be treated operatively or non-operatively.[4–9] Historically, displaced intra-articular fracture and calcaneal fractures were treated conservatively, as predictable operative reduction and fixation were not possible.[7,8,11] Operative treatment became more popular, as fracture care improved.[12–15] Reviews on this subject, however, have failed to demonstrate indisputable superior results of a single line of treatment for displaced intra-articular calcaneal fracture.[10,14,16–18]

The locking compression plate has improved the functional results, limited indications for bone grafting and shortened recovery time, i.e. decreased morbidity.[4,5] The purpose of our study was to evaluate the functional outcome and complications of fracture treated with calcaneal-locking compression plate in Indian population.

2. Materials and methods

2.1. *Design of the study*

This was a prospective interventional study.

Thirty patients of age group 18–50 years attending to Orthopaedics Emergency and the Out Patient Department of our institute, with fracture of the calcaneus without any other life threatening injury were included in the study after thorough clinical and radiological examination. Informed written consent was obtained from the patients prior to inclusion in the study.

All the patients with fracture of intra-articular calcaneum that were included in the study were selected according to the following inclusion criteria.

2.1.1. *Inclusion criteria*

1. Displaced intra-articular fracture involving posterior facet.
2. Fracture of anterior process of calcaneum with more than 25% involvement of calcaneo-cuboid joint.
3. Displaced fracture of calcaneal tuberosity.
4. Fracture – dislocation of calcaneus.

2.1.2. *Exclusion criteria*

The factors amounting to exclusion are given as follows:

a. Nondisplaced or minimally displaced extra-articular fractures.
b. Fractures in patients with peripheral vascular disease, diabetes mellitus, bleeding disorders and neuropathic foot.
c. Grossly contaminated wound.
d. Pathological fracture of calcaneum.

2.2. *Pre-op evaluation*

After admission, the patients were worked up clinically and radiologically, and they underwent routine investigations and pre-anaesthetic check-up. The following were considered: X-ray calcaneum anteroposterior view to assess involvement of calcaneocuboid joint and fracture of anterior process, lateral view (Figs. 1 and 2) to assess Boehler's angle and crucial angle of Gissane and Harris-heel axial view X-ray to assess posterior articular facet along with a CT-scan calcaneum in sagittal (Figs. 3 and 4) and axial plane (Fig. 5) with 3D reconstruction to assess and classify the fracture according to Sander's classification.

2.3. *Procedure*

All surgeries were performed under anaesthesia with the patient in lateral position. The affected limb was cleaned, painted and draped.

Fig. 1 – (Case 1) Pre-op X-ray calcaneum lateral view.

Fig. 2 – (Case 2) Pre-op X-ray calcaneum lateral view.