



## A STUDY OF FUNCTIONAL OUTCOME OF CALCANEAL FRACTURES TREATED WITH OPEN REDUCTION AND INTERNAL FIXATION

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### ABSTRACT

The aim of our study is to evaluate the functional outcome of intra-articular calcaneal fractures treated with open reduction and internal fixation, as measured by the AOFAS Scoring system, the mean duration of union, and associated complications. 26 patients with intra-articular fractures of the calcaneum were treated with open reduction and internal fixation using 3.5mm locking calcaneal plates. Patients were followed up regularly 6 weeks, 12 weeks and 6 months.

The average time for union in all the 26 patients was 12.77 weeks. The functional outcome was good in 17 patients, fair in 7 patients and poor in 2 cases. The complications associated with plating were more in Sander's type III fractures. We are of the opinion that surgery is the choice of treatment; and attaining anatomical reduction gives a better functional outcome.

### KEYWORDS :

#### INTRODUCTION:

Calcaneum fractures comprises of approximately 2% of all fractures, the most common mechanism being fall from height producing axial loading. Regardless of the treatment, calcaneal fractures are associated with many complications and poor outcomes with significant long term quality of life issues. The primary source of debate has been the issue whether better results are achieved with operative or non-operative method.

Open reduction and fixation is not the preferred way of treatment among many surgeons in rural India probably because it demands good surgical expertise and due to the high complication rates associated with the fracture even with good fixation. This is a humble effort to quantify the functional outcome of calcaneal fractures treated with open reduction and internal fixation; so that more such cases can be treated with surgical fixation in future in our part of the world.

#### MATERIALS AND METHODS:

##### Source of data:

Our study included all patients who attended the department of orthopedics, Govt Medical College, Thrissur during the period of study, that is, from 1st January 2015 to 1st January 2016 who have sustained intraarticular fracture of the calcaneum and were treated with open reduction and internal fixation.

##### Method of collection of data:

All patients who were treated with open reduction and internal fixation of the intraarticular fracture of calcaneum were evaluated during their hospital stay and in op.

A thorough history and clinical examination were taken and recorded. The skin condition were evaluated for swelling and blisters and recorded. Roentgenograms were taken including lateral view and axial view of the calcaneum. Other relevant evaluations were made as needed.

The patients were initially counseled about the condition and treated with below knee POP slab, limb elevation, analgesics and other supportive measures. All patients were classified with Essex Lopresti classification and Sander's classification. The patients were planned for open reduction and internal fixation and the pre op work up were done. After the appearance of wrinkle sign along the lateral aspect of the ankle, the patients were operated by open reduction and internal fixation with a locking calcaneal plate. The steps of surgery were strictly based on the extensile lateral approach. All surgeries were done by experienced surgeons in Govt. Medical College, Thrissur.

All patients were evaluated whenever they come for follow up in OP, especially during 6 weeks, 12 weeks and 6 months. The patients were evaluated clinically and radiologically. The patients were examined for assessing the wound status, skin condition, tenderness, stability,

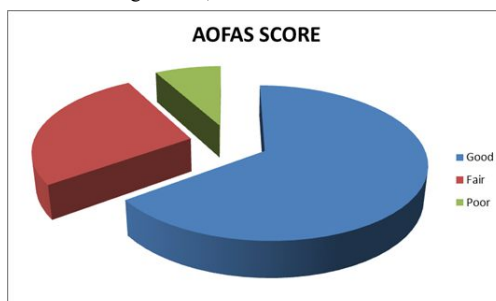
range of motion of ankle and subtalar joint. Plain x-ray lateral and axial views were taken and assessed in each visit. Clinical union was declared in our study when the fracture site became stable and pain free. The fractures were declared united radiologically when bony trabeculae crossing fracture site.

If no clinical or radiological signs of union were present even after 16 weeks, patients were classified as delayed union in our study. American Orthopedic Foot And Ankle Society (AOFAS) ankle foot scoring system was used for assessing the functional outcome at 6 months. The AOFAS scoring system was developed by the American Academy of Orthopaedic Surgeons (AAOS) and has been validated by various studies<sup>1</sup>.

#### RESULTS:

The age distribution range of 26 patients ranged from 22 to 60 years in our study and the average age was 38.07. All the cases involved in the study were males and mode of injury in all patients was fall from height. 14 (53.8) patients had their left calcaneum fractured while 12 (46.15) patients were with fracture of right calcaneum. All the patients were classified as joint depression types according to Essex Lopresti classification.

7 out of 26 (26.9%) were type II according to Sander's classification, 18 (69.3%) were type III and 1(3.8) was type IV. The average number of days between fall and surgery was 10.8 days. All patients had post operative swelling as one complication, which subsided after some weeks. 11 patients had post operative pain out of which two patients had persistent mild to moderate pain. 2 patients out of 26 developed moderate superficial infection. These patients were treated with intravenous antibiotics. Both the patients got their infection subsided within 10 days and didn't had any recurrences. 2 other patients developed severe deep wound infection and had discharge from wounds on every routine follow ups in op. They were treated with parenteral antibiotics initially and then converted to oral antibiotics according to sensitivity. One of the patients' plate got exposed along with the discharge and implant was removed early at 6 months and after that the wound got clean, subtalar arthrodesis was done later.



In our study, 16 patients (65%) had good functional outcome as per AOFAS Scoring system. The mean AOFAS score among these patients was 82.06. 7 patients (27%) had fair functional outcome and their mean score was 72.14. 2 patients (8%) had poor functional outcome and their mean score was 55. None of them had excellent functional outcome.

#### DISCUSSION:

Calcaneum, which is the most commonly fractured tarsal bone, has always been a topic of debate among surgeons with respect to the perfect line of management probably because of the high complication rates associated with calcaneal intra articular fractures both in conservatively and surgically managed patients.

Some studies with more than 100 cases showed good results after open reduction and internal fixation of intraarticular calcaneal fractures<sup>2,3,4</sup>. But some prospective randomized studies didn't show better results after surgery<sup>5,6</sup>. Hence, there always existed some controversies. However, in the largest prospective randomized trial described to date, Buckley et al. found better results in some subgroups of patients after surgery<sup>7</sup>.

We believe that displaced intra-articular calcaneal fractures should be treated by anatomical reduction and rigid internal fixation, to allow early movement and for a better functional outcome<sup>8</sup>. Application of these principles to intra-articular calcaneal fractures was always difficult because of complex bony anatomy, tenous soft tissue envelope and difficulty of acquiring anatomic reduction and rigid fixation<sup>9</sup>.

AOFAS clinical scoring system is a standard scoring system for foot function evaluation<sup>1</sup>. Melcher followed up patients operated by ORIF 3 and 10 years after the surgery. In the study, subjective and objective results assessed after 10 years were better than those achieved in a three-year follow-up<sup>10</sup>. In Sander's study, excellent or good results were seen in 73% of type-II, 70% of type-III, and 27% of type-IV fractures<sup>11</sup>. It was comparable to our study, in which 65% of patients had good and 35% had fair or poor results.

Complications occur regardless of the management chosen for displaced intra-articular fractures. Complications can cause of significant morbidity for patients<sup>12</sup>. Rate of wound complications (superficial and deep infections) in our study was 15.3%, which is similar to that in many studies in literature<sup>3</sup>.

The average number of Sander's type III fractures in our study was 69% which is not comparable to studies by Biz C1, Barison E2, Ruggieri P2<sup>13</sup>. This is probably because in developing countries like ours, less complicated fractures like Sander's type II will be managed at secondary care centers as conservatively and are not referred to tertiary centers. The average days between fall and surgery in our study were 10.8 days, which is comparable to studies by Weber M1, Lehmann O, Sägesser D<sup>14</sup>.

There were certain limitations to our study. Only 26 patients with calcaneal fractures were operated and their functional outcome was measured at a mean follow-up of only 6 months. A study involving a comparatively large number of patients followed up for a longer period of time can more accurately assess the functional outcome of displaced intra-articular fractures of the calcaneum treated by this method. Therefore this discussion can be considered only as a preliminary assessment.

#### CONCLUSION:

We are of the opinion from our study experience that the operative treatment of intra-articular calcaneal fractures should be needed, as anatomical reduction and rigid internal fixation is essential for early movement and weight bearing. The technique with a lateral approach is good in terms of fracture union and functional outcome. But one should be cautious about the wound complications while treating by this method. The fallacies in our study are, the sample size is small, and the follow up period is only 6 months.

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