

Management of Tongue Shaped Intra-Articular Calcaneal Fracture with Essex Lopresti Technique

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Abstract

Background: Calcaneum fractures account for 2% all fractures. Intra-articular fractures account for approximately 75% of calcaneal fractures and historically have been associated with poor functional outcome. These fractures are uniformly caused by an axial load mechanism, such as a fall from Height or a motor vehicle accident. The current preference in the surgical treatment of calcaneum fractures is open reduction and internal fixation. However, there were some unsatisfactory results from this technique such as flap necrosis, deep infection and non-union. In selected cases, it is possible to obtain reduction with a percutaneous approach with the Essex-Lopresti Technique using an axial pin. The technique of closed reduction and percutaneous fixation was introduced by Westheus and popularized by Gissane. But the credit for describing the technique goes to Essex-Lopresti. The effectiveness of this technique in the restoration of Böhler's angle and calcaneal height in tongue shaped is well documented.

Aim: To evaluate the outcome of Essex Lopresti technique in intraarticular tongue shaped calcaneal fractures

Material and Methods: 20 patients with tongue shaped intraarticular calcaneum fractures were admitted and treated with closed reduction and pin fixation (Essex Lopresti technique) in vijayanagar institute of medical sciences, Bellary. Patients follow up done for 1year. Outcome of the study was evaluated using Creighton Nebraska Health Foundation Assessment sheet for calcaneum fractures.

Results: Incidence was common in 30 to 45years old male patient with most common mechanism of injury being fall from height. 20% of the patients were associated with other side comminuted calcaneum fracture and 30% patient were with other bones fracture. 80% of patient had good results and 20% had fair result with no poor results.

Conclusion: Essex Lopresti technique is effective technique for tongue shaped intraarticular calcaneum fractures with excellent outcome and acceptable complications.

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Introduction

Calcaeneum fractures are most common fractures in tarsal bones accounting for 60% and 2% of all adult fractures¹. Approximately 75% of these injuries are intra-articular and most of them occur due to axial load such as a fall from a height or motor vehicle accident. Historically most fractures treated conservatively due to high complication rates associated with open reduction and internal fixation²⁻¹². However since past two decades the pendulum has swung back towards surgical management due to better understanding of fracture pattern and improved surgical techniques^{4,5,13}. After the development of new imaging techniques, sanders et al¹⁷ described the classification of calcaneal fractures using coronal and transverse computed tomography scans and concluded that displaced intraarticular fractures require an anatomic reduction with stable fixation for good joint function.

Buckley and Meek¹⁸ retrospective study suggested that a posterior facet reduction within 1mm is required to produce results superior to closed or non-operative treatment. Sanders et al¹⁷ also described posterior facet reduction and optimal final outcome.

Technique of indirect reduction and percutaneous pin fixation was first introduced by Westheus in 1934. The technique was further developed by Gissane. However credit of this technique goes to Essex – Lopresti as he described entire technique in sequence and for the introduction of shoe plaster to incorporate the pin¹⁴. The effectiveness of this technique in restoration of Bohler's angle and calcaneal height in tongue shaped fractures is well documented^{15,16}. Open reduction and internal fixation has got catastrophic complications including wound complications and sural neuritis which can be avoided with this technique.

The purpose of current study is to review the technique and clinical outcomes of Essex-Lopresti technique in calcaneal tongue shaped fractures.

Materials and Methods

From June 2014 to June 2015, 20 patients admitted to our hospital with calcaeneum fracture. Patients underwent routine investigations with radiographic examination. Radiographic examination involved AP view, lateral view and Harris axial view. Patient

diagnosed of tongue shaped calcaneum fracture for which they underwent percutaneous pinning procedure as described below. Preoperative and postoperative calcaneal angles (Bohler's and gissane's) measured. Correction achieved was documented.

Technique: under spinal/general anesthesia patient in lateral position incision measuring 1cm taken over displaced calcaneum tuberosity just lateral to tendo achilles tendon. 4.5mm steimann pin selected and inserted into tongue shaped fragment under fluroscopic guidance. Elevation the fragment done using inserted steiman pin as lever. Widened heel is reduced by pressing the heel from mediolateral aspect. After achieving reduction pin passed into anterior calcaneum fragment. Position of the steimann pin and reduction checked under c-arm. After procedure short leg cast is applied by keeping the pin outside the cast.

Postoperatively mobilisation of patient started on first post operative with nonweight bearing on operated limb with crutches. Follow up of the patient done at 2wks, 6wks, 3months, 6months and 1year. Pin was removed at 6wks with continuation of short leg cast. Weight bearing started on radiographic union of fracture which

was around 8 to 10 weeks. Following removal of cast patients advised for ankle and foot physiotherapy. Functional assessment was carried out using Maryland Foot Score.

Results

Mean age incidence was 40yrs with 90% male predominance. Most common mechanism of injury being fall from height (80%) remaining due to RTA (20%). In 20 patients 2 had bilateral calcaneum fracture for which one pt managed conservatively another pt with calcaneum plating for other limb. 3 patients were associated with other bone fractures. Mean hospital stay was 3days. With no complications of wound healing or pin infection. No patients needed second surgical procedure except for pin removal at 6wks. Mean peroid of union was 9wks. Preoperative bohler angle was between 10 to 18 degrees. Mean correction obtained in bohler angle was in normal range (28degrees). Maryland foot score rated 15 as excellent, 2 as good and 3 as fair results.



Figure1: Preoperative X Ray



Fig. 3: C Arm Picture of Axial View - After reduction



Figure2: C Arm picture after achieving reduction - Lateral View



Fig. 4: Postoperative - short leg cast applied



Fig. 5: Immediate Postoperative X-Ray



Fig. 6: 10 weeks Postoperative X Ray



Fig. 7: 6months Follow up X ray

Discussion

Till now there is no best clinical criteria for treating calcaneum fractures, in general it is well accepted that treatment should aim at anatomical restoration of joint surface and width height length of the heel to achieve functional recovery^{19,20}. The Essex Lopresti method of

reduction allows early motion without loss of reduction and popularized in patients with risk factors like smoking, diabetes, peripheral vascular diseases where wound healing complication is potential.

King²¹ assessed the results of 75 consecutive fractures of Os calcis involving the posterior facet treated by Essex-Lopresti method. He concluded that the best results were encountered in tongue-type fracture and less satisfactory results were seen in joint depression type.

Tornetta^{15,16} evaluated 26 consecutive patients with Essex-Lopresti tongue-type fracture. There were 12(55%) excellent, 7(32%) good and 3(13%) fair results. He concluded that the Essex-Lopresti spike reduction is a useful method for the treatment of tongue-type fractures of the calcaneus and the results were superior to those in previous series of intra-articular fractures treated with open reduction and internal fixation.

As recently as in 2007, Pillai²³ described a modification of the classical technique of Essex-Lopresti. Using the Maryland Foot Score, they achieved fair to excellent results in 67% patients.

Compared to open procedures, percutaneous reduction and fixation offers lower complication rates, shorter operating times and more rapid healing due to the undisturbed soft tissue envelope. For carefully selected patients, this technique provides good results comparable with open reduction and internal fixation^{24,25}.

Delayed wound healing is one of the most commonly encountered complications in open reduction of calcaneal fractures. With the use of percutaneous technique, this problem can be obviated^{26,27}. Our results conclude that the percutaneous technique is best suited for tongue shaped fractures. In tongue shaped fractures, the posterior articular facet is in continuous with posterior tuberosity. Direct manipulation of facet is possible by traction and a pin inserted into posterior tuberosity. This allows fracture to be reduced percutaneously²². In joint depression type, the posterior articular facet is depressed, rotated and impacted. Since direct manipulation of fragment is not possible. It becomes difficult to attain accurate reduction by this technique²²

Bohler's angle is commonly assessed when evaluating calcaneal fractures. A number of studies clearly indicate that bohler's angle is good predictor of long term functional outcome in calcaneal fractures²⁸. Patient with angles less than 15 degrees did significantly worse than those with greater angles. This was the reason for choosing bohler's angle as the measure of surgical reduction in our patients. In our series mean bohler's angle achieved postoperatively was more than 15 degrees.

Conclusion

Essex Lopresti technique is effective technique for tongue shaped intraarticular calcaneum fractures with excellent outcome and acceptable complications.

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