International Journal of Research in Orthopaedics
Marikannan C et al. Int J Res Orthop. 2020 May;6(3):506-510
http://www.ijoro.org

Original Research Article

DOI: http://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20201538

Is surgery the only option for unstable ankle fracture?

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Received: 14 March 2020
Revised: 29 March 2020
Accepted: 31 March 2020

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ABSTRACT

Background: Ankle fracture is one of the most common injuries in sports and daily activity. Unstable ankle fracture that are displaced fracture of the lateral malleolus and most bimalleolar or trimalleolar fractures need surgical reduction and fixation.
Methods: It is a single centre study in which all unstable ankle fracture above the age of 18 and not associated with any other injury were included in the study. Following fixation patients were followed up at 6 weeks, 3 months and 6 months and functional outcome was assessed with American Orthopaedic Foot and Ankle score (AOFAS).
Results: Supination external rotation injury was most common type. Mean AOFAS score at the end of six months was found to be best in supination adduction type. Posterior malleolus fixation with screw were found to have maximum AOFAS score.
Conclusions: Surgical outcome in unstable ankle fracture are proved to have good functional outcome.

Keywords: Ankle fracture, Unstable ankle, Bimalleolar and trimalleolar fracture

INTRODUCTION

Ankle fracture is one of the most common injuries in sports and daily activity. Many literatures are available from 300 BC for ankle injuries. Basic understanding of ankle fractures was elaborately explained by Sir Percival Pott (1714-1788), Tillaux (1872), Baron Dupuytren, J.G. Maisonneuve. However, fracture pattern has been described after the invention of X-rays by Konard Roentgen (1895). Clinical and radiological findings based on cadaveric experiments gave birth for Lauge Hansen classification in 1950. Displaced fracture of the lateral malleolus and most bimalleolar or trimalleolar fractures need surgical reduction and fixation. Metallic implants provide good stability and early rehabilitation. Association between fracture pattern and method of fixation is the important predictor of clinical outcome in unstable ankle fractures. While the results of open reduction and internal fixation of isolated fibular, bimalleolar, and trimalleolar ankle fractures have been frequently reported, studies of patient-oriented, validated functional outcomes are scarce in the literature.[1-4]

Most of the ankle fractures were initially treated by closed reduction and immobilization with cast or slab. Through years of advancement and modern evolution of orthopaedics unstable ankle fractures are treated by open reduction and internal fixation which have yielded satisfactory results.

Aim

In this study we aim to analyse the need for fixing unstable ankle fracture by assessing their functional outcome.

METHODS

This is a single centre prospective study which was approved by the institutional ethics committee, SRIHER. REF: CSP-MED/18/JUN/44/105 done in Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai during the time period of September 2017 to September 2019 with sample size of 25. Only patients with case of acute trauma without any preexisting ankle problems or associated injuries were included in this study. A total of 25 patients with 8 males and 17 females were part of the study. On having obtained consent for the study. Plain radiographs, anteroposterior and lateral (non-weightbearing) projections, are part of the initial evaluation. Unstable ankle fracture is arrived based on 50% tibio talar instability – either anteroposteriorly or mediolaterally and they were classified based on Lauge-Hansen classification (Figure 1 A and B). Patient was taken up for surgery with method of fixation was surgeon dependent where either plate, cannulated cancellous screw or tension band wiring were used (Figure 2 A and B). The functional outcome of the patient was assessed with American Orthopaedic Foot and Ankle score (AOFAS) at regular intervals of 6 weeks, 3 months and 6 months. The collected data were analyzed with IBS. SPSS statistics software 23.0 version. After dividing the data collected into quantitative and qualitative variables the data was analyzed using frequency analysis, percentage analysis, mean, S.D, Pearson chi square test and T-test. Univariate analysis was also carried out. Using a statistical tool the probability value (p) of ≤0.05 was considered as significant.

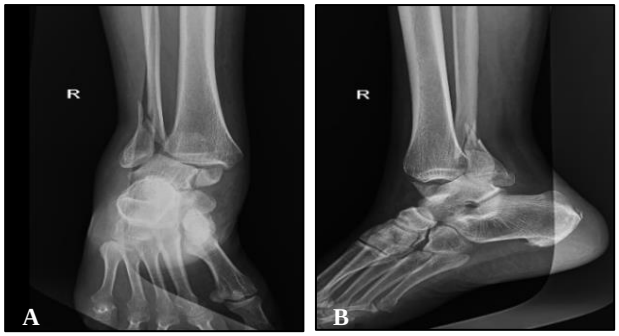

Figure 1 (A and B): Pre operative radiograph of unstable ankle fracture.

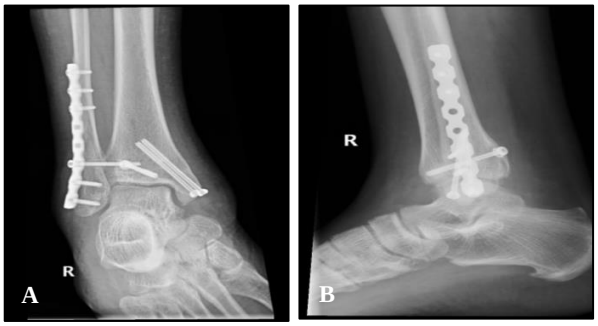

Figure 2 (A and B): Post operative radiograph

RESULTS

In a study of 25 cases, 17 patients were female (68%) and 8 patients were male (32%).

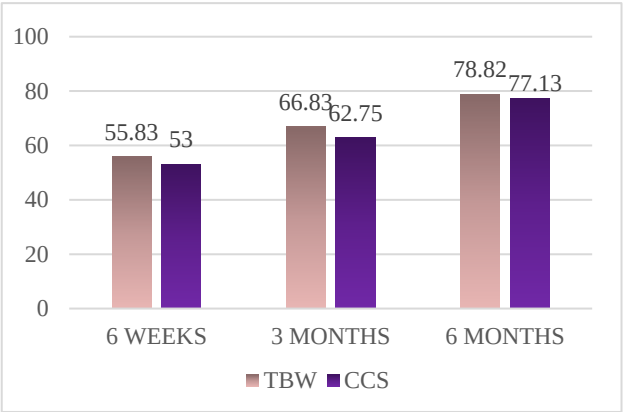

Figure 3: Mean AOFAS score in posterior malleolus fixed and unfixed cases at 6 weeks, 3 months and 6 months.

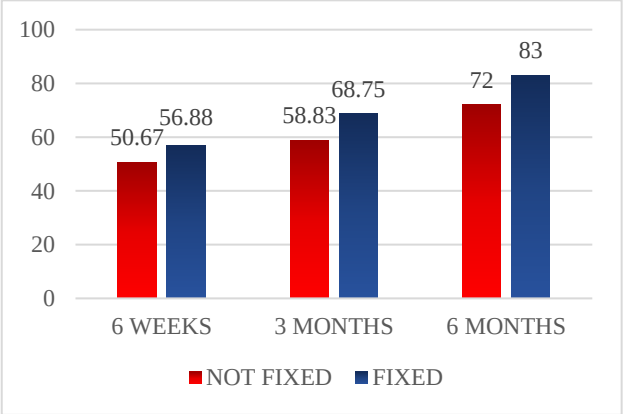

Figure 4: Effect of posterior malleolus fixation and mean AOFAS score at 6 weeks, 3 months and 6 months.

Right side was more commonly affected 17 (68%) than left side 8 (32%). Fractures caused by Road traffic traffic accident 18 (72%) were more than Twisting type of injury 7 (28%). Among 25 cases 9 patients had supination external rotation, 8 had pronation external rotation type, 5 had pronation abduction and 3 had supination adduction. Functional outcome as per AOFAS score at 3rd and 6th month was better in patients whose posterior malleolus was fixed (Figure 3 and 4) (mean AOFAS score 83.00) than unfixed (mean 72.00). Among the four types the mean AOFAS score were high in supination external rotation type at 6 weeks (56.33) and pronation abduction at 3 months (70.2) and supination adduction at 6 months (89.67) (Figure 5). Overall mean AOFAS score for all unstable ankle fracture was 81.64 which was found to be good functional outcome in surgical fixation of unstable ankle fracture (Figure 6).

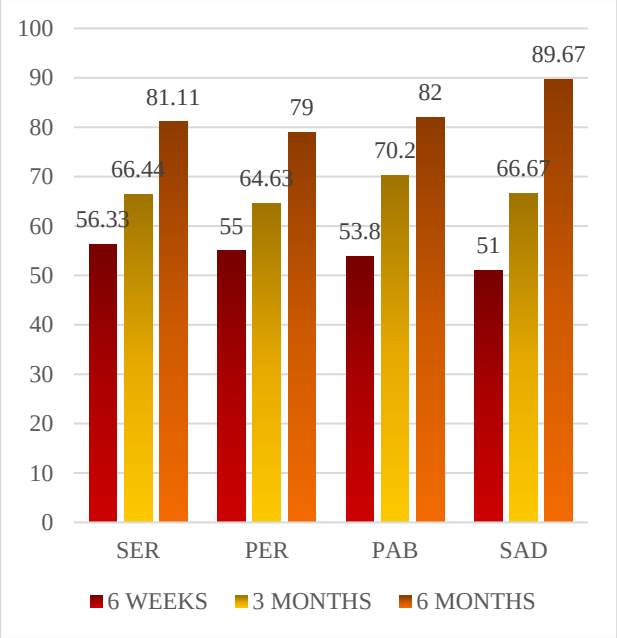

Figure 5: Mean of AOFAS score at 6 weeks, 3 months and 6 months based on Lauge Hansen type.

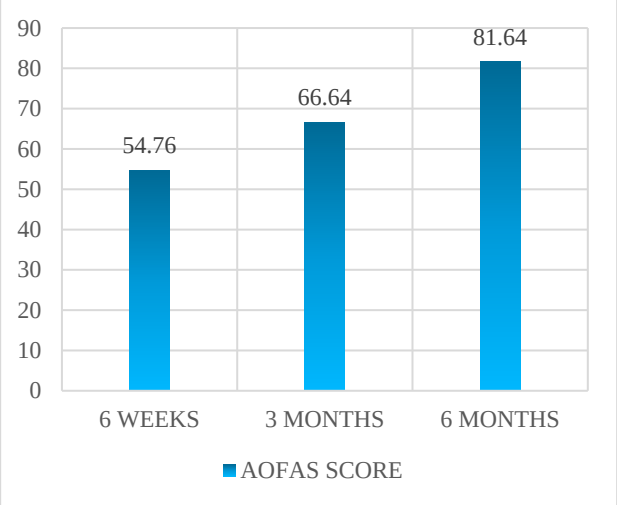

Figure 6: Mean AOFAS score of unstable ankle fracture.

DISCUSSION

Ankle fracture with tibio talar subluxation or dislocation have variable outcome. In a recent report, ankle fracture-dislocations had a statistically significant functional difference between groups classified based on Lauge Hansen type. In the study overall functional outcome by mean AOFAS score was good with supination – adduction type of injury (mean score 89) and fair in pronation external rotation (mean score - 79). In year 2018, Lawson at el published in AOFAS, ankle fracture-dislocations: a review which states that poor functional outcome was seen in pronation- external rotation injury.[5]

In our study overall functional outcome was excellent with younger age group, male sex. In 2006, Egol et al published that patients with younger age, male predominance, absence of diabetes and a lower American Society of Anesthesiologists (ASA) class are predictive of good functional recovery than the patients of older age ASA class III or IV with associated co morbids.[6]

All fractures were evaluated by intra operative radiography for syndesmotic injury. In unstable ankle fracture there was no significant change in functional outcome with trans-syndesmotic screw fixation. Jordan et al described that ankle injuries requiring stabilization of syndesmotic instability with the use of trans-syndesmotic fixation achieve a stable ankle mortise after removal of syndesmotic screw.[7]

Posterior malleolar fractures are observed in approximately 14% to 44% of all ankle fractures.[8,9] These types of fractures usually include the posterior tubercle of the distal tibia or posteromedial tibial plafond. The most common type of posterior malleolar fracture involves the posterior tubercle, resulting in an avulsion of the posterior inferior tibiofibular ligament following a rotational ankle injury. The treatment of ankle fractures with the involvement of posterior malleolus remains a subject of debate. Most authors recommend fixation when the fracture comprises >25% of the articular surface.[9-17] Posterior malleolus fractures are frequently left unfixed because they are expected to be reduced spontaneously after open reduction of the lateral malleolus.[18] When a posterior fragment is present, surgical technique fails more often in the anatomic reduction of the joint.[9] As the surgical treatment of posterior malleolus fracture requires approaches other than traditional medial or lateral incisions, orthopedic surgeons may have a tendency to neglect the posterior malleolus fractures or underestimate the size of the fragment. Posterior malleolar fragment was fixed according to fragment size and surgeons preference in the earlier cases. Then, afterward, posterior malleolus fracture management was done regardless of the size of the fracture fragment.

In our study, patients with trimalleolar fracture who had underwent fixation of posterior malleolus showed good functional outcome than who didn't undergo posterior malleolus fixation. The mean AOFAS score are better with the group in which posterior malleolus were fixed (mean score - 83) when compared with the group in which it was not fixed (mean score – 72) which also showed significant p value (<0.05) in both 3rd and 6th month. Comparisons between similar studies were made as shown in Table 1. Chung et al treated 15 cases of posterior malleolus fracture, yielding 5 excellent and 7 good outcomes.[19] Lee et al investigated ten cases of trimalleolar fractures. All patients in their series received excellent AOFAS score following open reduction and internal fixation of posterior malleolar fragment.[20] Miller et al suggested that fixation of posterior malleolus fracture is more likely to restore stability to the syndesmosis compared to trans-syndesmotic fixation alone.[21]

Table 1: Comparison of posterior malleolus fixation with final AOFAS score.

		Our study	Chung et al[19]	Tosun et al[24]	Van hoof et al[25]
Number of cases		14	8	49	25
Fixed		8	8	20	25
Unfixed		6	0	29	0
Final AOFAS score	Fixed	85	83	92	81
	Unfixed	-	72	70	-

Solan et al in November 2017 published regarding posterior malleolus fractures worth fixing and stated that there is always merit in fixing posterior malleolus fractures. After reduction of posterior malleolus tibia articular surface is restored, syndesmosis is more stable.[22] In addition to this Lampridis et al also recommended fixation of posterior malleolus through posterior approach should be undertaken as this can reduce the need for syndesmotic fixation.[23] Similarly, in 2018 Tosun et al published posterior malleolar fracture fixation is closely related to successful radiological and functional outcomes after trimalleolar fractures. Transyndesmal screw fixation may not be needed in cases where the posterior malleolar fractures are fixed. For these reasons, it's better that all posterior malleolar fractures have to be fixed regardless of size.[24]

CONCLUSION

All unstable ankle fractures showed good outcome following surgical fixation as per AOFAS score. Overall functional outcome was good with supination adduction followed by pronation abduction, supination external rotation and pronation external rotation. There was a significant functional outcome following posterior malleolus fixation. So, it is ideal to fix posterior malleolus. Effect of syndesmotic screw fixation has no significant change when compared with group in which syndesmotic screw fixation was not done. Young age, male sex, ASA class I have better functional recovery.

Limitations

A larger multicentric sample size would have helped us to draw better conclusions.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Marikannan C, Dorai KR, Mohan CB, Thirunthaiyan MR, Tarun PKR. Is surgery the only option for unstable ankle fracture?. Int J Res Orthop 2020;6:506-10.