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Functional outcome following surgical management of ankle fractures

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Abstract

Background: The ankle fractures is one of the most common fractures, increasing in an ageing population, but not generally seen as an osteoporotic fracture. The purpose of this study is to assess the functional outcome following surgical management of ankle fractures.

Methods: It is a prospective study which was carried out from November 2017 to May 2019 in Rajarajeshwari Medical College and hospital, Bangalore. In this study period 30 cases of ankle fractures, meeting the inclusion and exclusion criteria were treated by open reduction and internal fixation using appropriate implants. Clinical history, socio-demographic profile, anatomic classification and Lauge-Hansen's classification was noted for all patients. Baird and Jackson's ankle scoring system of subjective, objective and radiographic criteria were used for the study. All the patients were evaluated and scores were given.

Results: Average time taken for fracture healing was 9.97 weeks. Superficial infection of the wound was the most common complication in our study, seen in 3 patients, which healed uneventfully. We had good to excellent functional outcome results in 83.4% of the cases and fair results in 16.6% of cases.

Conclusion: Good functional results are obtained by surgical management of bimalleolar ankle fractures. Early weight bearing and mobilisation is achieved in these patients. If a weight bearing joint like ankle is involved, Anatomical reduction with restoration of the articular congruence is essential in all intra articular fractures and open reduction and internal fixation restore the articular congruity of the ankle joint.

Keywords: Ankle fracture, outcome, bimalleolar fracture

Introduction

Ankle fractures are one of the common types of fractures treated by orthopaedic surgeons. There has been an increase in the prevalence of such fractures over the last two decades both in the young and active patients and in the elderly^[1, 2]. Ankle injuries gain importance because the whole-body weight is transmitted through the ankle and locomotion depends upon the stability of the ankle joint. They have the potential to produce significant long-term disability and complications in the form of pain, instability and early degenerative arthritis^[3]. Anatomic restoration of the joint is the goal of management in fractures around the ankle joint. Open reduction and internal fixation are the standard care for unstable ankle fractures^[4].

However very few studies has been done about the functional recovery following operative treatment of ankle fractures^[5]. The purpose of this study is to assess the functional outcome following surgical management of ankle fractures.

Material and Methods

Study design and sample population

We conducted a hospital based prospective study in the Department of Orthopaedics, Rajarajeshwari Medical College and Hospital, Bangalore, Karnataka from November 2017 till November, 2019. All patients who presented to our hospital with any type of ankle malleolar fracture and underwent surgery and gave their consent to participate in the study were included in the study. Patients with compound fractures, Pilon fractures, those with any other associated fractures of ipsilateral limb and those patients who were medically unfit for surgery and or anaesthesia were excluded from the study. Institutional ethics committee approval was sought before we started enrolling the patients.

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Surgical technique and post-operative protocol

Under spinal and /epidural anaesthesia, the patient was placed in supine position. The ipsilateral buttock was raised on a sandbag to improve the exposure of the lateral side. Pneumatic tourniquet was applied in all cases to provide the bloodless field, which facilitates good visibility to describe the fracture pattern and thus facilitating anatomical reduction. The affected limb was draped from the knee joint to the nail tip and then painted with betadine solution. The foot was covered with a glove. On an average the duration of surgery was around 60 to 90 minutes, medial malleolar fractures were fixed either by tension band wiring or malleolar screws or 4 mm cannulated cancellous screws and lateral malleoli was fixed with either one third tubular plate or recon plate and screws. Closure of the operative wound was done according to the standard protocol. After 24 hrs x-rays anteroposterior and lateral views were taken. Wounds were inspected on 3rd day. Sutures were removed on 12th post-operative day on an average. Below knee pop cast was given and discharged with

instruction of non-weight bearing over the affected limb for a period of 6 weeks. Partial weight bearing was encouraged after the removal of the cast (after clinical and radiological signs of union become evident). Active exercises of the ankle were advised to prevent stiffness. In patients with ankle fractures and syndesmotic injury following syndesmotic screw fixation, the weight bearing was delayed until the screw removal which usually averages between 4 to 6 weeks. Follow up of cases was done at regular intervals of 6 weeks for minimum of 6 months. At each assessment, all patients were questioned and evaluated with regard to pain, use of analgesics, stiffness, swelling, activities of daily living, use of walking aids, and return to work and participation in sports. During follow up, the gait, any thickening, swelling, tenderness of the ankle and the range of motion of the ankle were evaluated. Anteroposterior, lateral and mortise radiographs of ankle were taken at the time of examination. Baird and Jackson's ankle scoring system of subjective, objective and radiographic criteria was used for the study ^[6].

Table 1: Show the Criteria Points

I. Pain		
A	No Pain	15
B	Mild pain with strenuous activity	12
C	Mild pain with activities of daily living	8
D	Pain on weight bearing	4
E	Pain at rest	0
II. Stability of ankle		
A	No clinical instability	15
B	Instability with sports activities	5
C	Instability with activities of daily living	0
III. Ability to walk		
A	Able to walk desired distances without limp or pain	15
B	Able to walk desired distances with mild limp or pain	12
C	Moderately restricted in ability to walk	8
D	Able to walk short distances only	4
E	Unable to walk	0
IV. Ability to run		
A	Able to run desired distances without pain	10
B	Able to run desired distances with slight pain	8
C	Moderate restriction in ability to run, with mild pain	6
D	Able to run short distances only	3
E	Unable to run	0
V. Ability to work		
A	Able to perform usual occupation without restrictions	10
B	Able to perform usual occupation with restrictions in some strenuous activities.	8
C	Able to perform usual occupation with substantial restrictions.	6
D	Partially disabled; selected jobs only	3
E	Unable to work	0
VI. Motion of the ankle		
A	Within 100 of uninjured ankle	10
B	Within 150 of uninjured ankle	7
C	Within 200 of uninjured ankle	4
D	<50% of uninjured ankle, or dorsiflexion <5 degrees	0
VII. Radiographic result		
A	Anatomic with intact mortise (normal medial clear space, normal superior joint space, no talar tilt)	25
B	Same as A with mild reactive changes at the joint margins	15
C	Measurable narrowing of superior joint space, with superior joint space >2mm, or talar tilt >2mm	10
D	Moderate narrowing of superior joint space, with superior joint space between 2 mm and 1 mm.	5
E	Severe narrowing of superior joint space, with superior joint space <1mm, widening of medial clear space, severe reactive changes (sclerotic subchondral bone and osteophyte formation).	0

Scores according to the Baird and Jackson scoring system

1. Excellent 96-100
2. Good 91-95
3. Fair 81-90
4. Poor 0-80

Maximum possible score-100.

All the patients were evaluated and scores were given.

Data collection and data analysis

After obtaining informed consent of the patient for inclusion

in the study, clinical history was obtained from the patient or the attendants to understand the mechanism of injury and the extend of trauma. Basic socio-demographic variables of the patients were noted. The patients were then assessed clinically to evaluate their local injury. All patients underwent plain radiographs in anteroposterior, lateral and mortise views. Patients were diagnosed based on history, clinical examination and radiological investigations. Anatomic classification and Lauge-Hansen's classification were done in all patients [7]. Patients were followed up at regular intervals in the post-operative period to assess for any complications. All the data will be noted in a pre-designed case report form. The data were analysed using SPSS software. Qualitative data were described as frequency distributions and quantitative data as means and standard deviations. Chi square test was used to check for association of functional outcome on Baird and Jackson criteria with various patient related variables, p value of less than 0.05 was taken as level of significance.

Results

During the study period 30 patients were enrolled in the study, the age distributions were 18 to 65 years (average-

42.07 years), majority of them i.e., 30% of the cases were in the age- group Of 31-40 years. More common in males (80%), compared to females (20%). Right ankle was more commonly affected (66.7%). Most common mode of injury was Road traffic accident (63.3%), followed by slip and fall (26.7%). According to Lauge-Hansen's classification, Supination-external rotation injuries were commonest (46.7%) in our series, followed by Pronation abduction (26.7%) and Pronation external rotation (16.7%). Majority of medial malleolar fractures were fixed with malleolar screw (66.7%). Majority of lateral malleolar fractures were fixed with 1/3 tubular plate and screws (83.3%). Two cases of syndesmosis injury were reduced and fixed with screw. Weight bearing was delayed till screw removal. Average time taken for fracture healing was 9.97 weeks. Superficial infection of the wound was the most common complication in our study, seen in 3 patients, which healed uneventfully. We had good to excellent functional outcome results in 83.4% of the cases and fair results in 16.6% of cases.

Case Illustrations: Case 1



Fig 1: Pre-operative X-ray

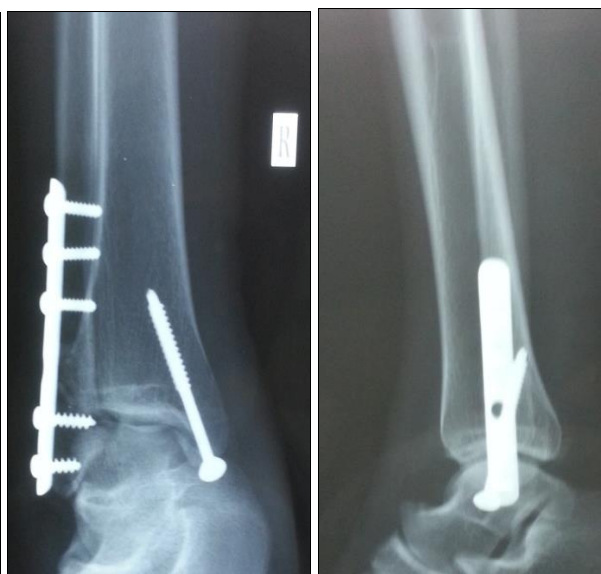


Fig 2: Post-operative X-ray

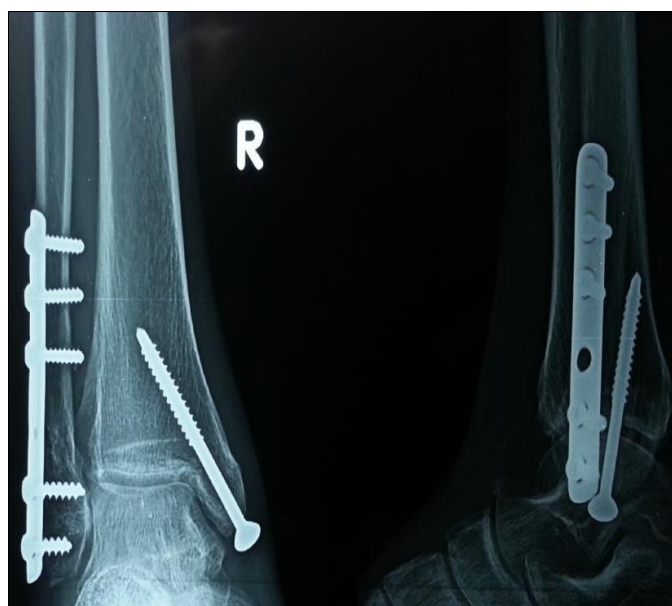


Fig 3: 6 Months follow up X-ray



Fig 4: Dorsiflexion of Ankle



Fig 5: Plantarflexion of Ankle



Fig 6: Standing on toe tips



Fig 7: Squatting position

Case 2



Fig 8: Pre-operative X-ray

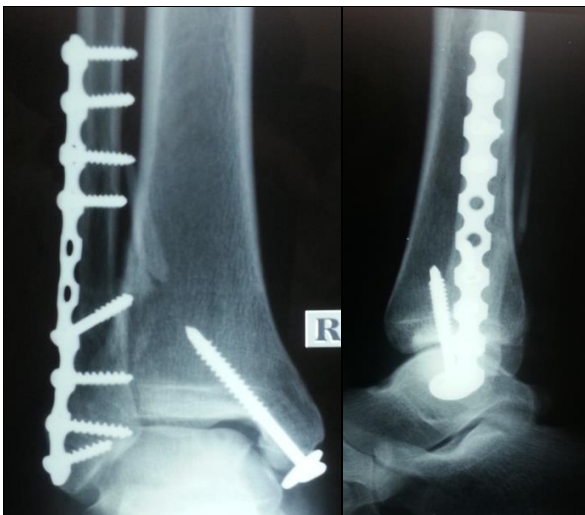


Fig 9: Post-operative X-ray



Fig 10: 6 Months follow up X-ray



Fig 11: Dorsiflexion of ankle



Fig 12: Plantarflexion of ankle



Fig 13: Standing on toe tips



Fig 14: Squatting position

Table 2: Baseline characteristics of patients included in the study

Number of patients	30
Mean age	42.07
Males	24
Affected side	
Right	20
Left	10
Mode of injury	
RTA	19
Fall of heavy object	3
Slip	8
Mechanism of injury	
Pronation Abduction	8
Supination Adduction	3
Supination External Rotation	14
Pronation External Rotation	5
Time interval between injury and surgery	
Time to Surgery (days)	
1	1
2	8
3	4
4	9
5	4
6	4
Post-operative complications	
Superficial Infection	3

Table 3: Functional outcome using Baird and Jackson score

Functional results	Frequency	Percent
Excellent	8	26.7
Good	17	56.7
Fair	5	16.7
Total	30	100.0

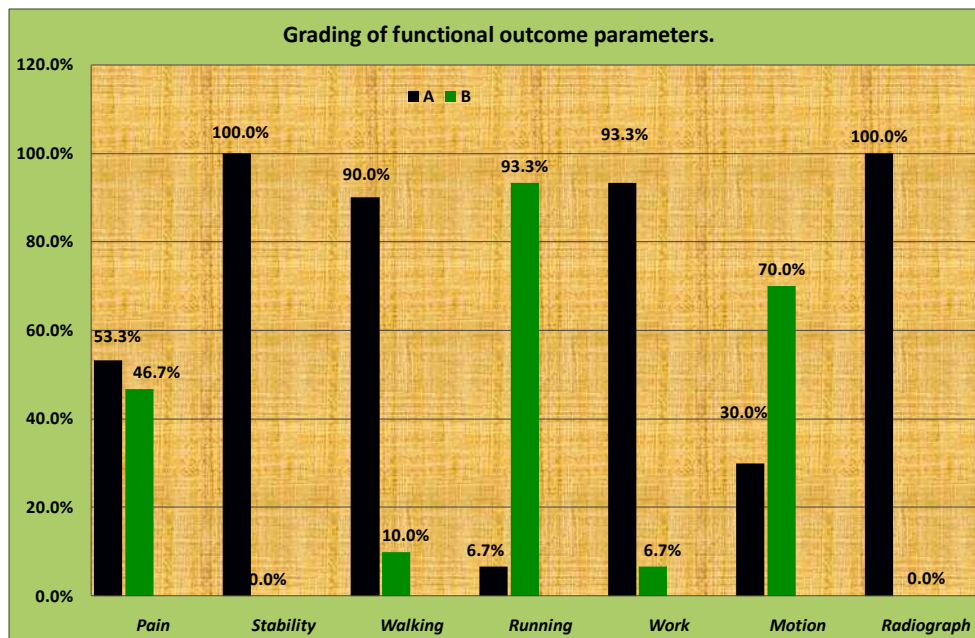


Fig 15: Chart 1-Grading of functional outcome parameters based on Baird and Jackson's ankle scoring system

Discussion

Our study demonstrated that majority of the patients had excellent and good functional outcome at the end of six months. The demographic profile and mechanism of injury in patients of this study were similar to previously published reports [8, 9]. Previously published studies have shown that short- and long-term outcomes after surgical intervention of unstable ankle fractures may have some residual function deficit [10]. Furthermore, bimalleolar fractures have shown to have worse outcomes than those associated with unimalleolar injuries [11]. Posterior malleolus fracture are also associated with poor outcomes as the presence of a posterior malleolus fracture may indicate higher energy injury. In our study we have noted the time interval between injury and time of surgery. Some authors have demonstrated a statistical significance between functional outcome and time outcome and time duration between injury and surgery [12]. These findings suggest that ankle fractures operated within 24 hours from injury had excellent to good functional outcome as compared to fracture operated after 24 hours.

Superficial skin infections were seen in 3 patients in our study. Similar complications have been noted by other authors as well. These infections usually occur in the early postoperative period. Deep skin infections, which may occur eventually, may ultimately lead to poor long-term function of the ankle joint and result in high morbidity. The infection rate following open surgical management of ankle fractures has been reported to be between 6% and 40%. Therefore, avoiding wound infections should be a high priority while managing these patients. Time to surgery also appears to be associated with achieving lower complication rates. Furthermore, the choice of implant like low profile thinner plates or fibular nailing may also affect the overall outcome [13, 14].

There were some limitations of this study. Firstly, sample size of this was relatively small. Secondly, not all patients had a computed tomography (CT) done for diagnosis and measurements. Some authors have suggested that CT scans may be required to accurately measure the size and anatomy of the malleolus and their reductions [15]. Thirdly, the outcomes of the operative management were only based on Baird Jackson score and the accurate management of

reductions was not done. Finally, the duration of follow up might not have been enough to measure the outcome appropriately. Obremskey *et al.* study shows with follow up duration for a period of 20 months, only after which the patients demonstrated significant improvement in pain and function [16].

Conclusion

In our study all the patients had Good functional outcome and all patients resume to their daily activity. Early weight bearing and mobilisation is achieved in these patients. If a weight bearing joint like ankle is involved, Anatomical reduction with restoration of the articular congruence is essential in all intra articular fractures and open reduction and internal fixation restore the articular congruity of the ankle joint. Further research is required to assess the clinical and functional outcomes in patients with long term follow up.

References

1. Bauer M, Benger U, Johnell O. Supination-eversion fractures of ankle joint: Changes in incidence over 30 years. *J Foot Ankle.* 1987; 8:26-8.
2. Daly PJ, Fitzgerald RH, Melton LJ, Lstrup DM. Epidemiology of ankle fractures. *Acta Orthopaedica Scandinavian.* 1987; 58:539-44.
3. Carragee EJ, Csongradi JJ, Bleck EE. Early complications in the operative treatment of ankle fractures. *J Bone Joint Surg.* 1991; 73B:79-82.
4. Bonasia DE, Rossi R, Saltzman CL. The Role of Arthroscopy in the Management of Fractures about the Ankle. *J Am Acad Orthop Surg.* 2011; 19(4):226-235.
5. Egol KA, Tejwani NC, Walsh MG. Predictors of Short-Term Functional Ankle Fracture Surgery. *J Bone Joint Surg Am.* 2006; 88(5):974-979.
6. Baird RA, Jackson ST. Fractures of the distal part of the fibula with associated disruption of the deltoid ligament. Treatment without repair of the deltoid ligament. *J Bone Joint Surg Am.* 1987; 69(9):1346-52.
7. Lindsj ÖU. Classification of ankle fractures: the Lauge-Hansen or AO system? *Clinical Orthop Related Res.* 1985; 199:12-6.
8. Court-Brown CM, Caesar B. Epidemiology of adult

- fractures: a review. *Injury*. 2006; 37:691-7.
9. Herscovici Jr. D, Scaduto JM, Infante A. Conservative treatment of isolated fractures of the medial malleolus. *J Bone Jt Surg*. 2007; 89:89-93.
 10. Shah NH, Sundaram RO, Velusamy A, Braithwaite IJ. Five-year functional outcome analysis of ankle fracture fixation. *Injury*. 2007; 38:1308-12.
 11. Tejwani NC, McLaurin TM, Walsh M, Bhadsavle S, Koval KJ, Egol KA *et al*. Are outcomes of bimalleolar fractures poorer than those of lateral malleolar fractures with medial ligamentous injury? *J Bone Joint Surg Am*. 2007; 89:1438-41.
 12. Schepers T, De Vries MR, Van Lieshout EM, Van der Elst M. The timing of ankle fracture surgery and the effect on infectious complications; a case series and systematic review of the literature. *Int. Orthop*. 2013; 37(3):489-94.
 13. Schepers T, Van Lieshout EM, De Vries MR, Van der Elst M. Increased rates of wound complications with locking plates in distal fibular fractures. *Injury*. 2011; 42(10):1125-9.
 14. Appleton P, McQueen M. The fibula nail for treatment of ankle fractures in elderly and high risk patients. *Techniques Foot Ankle Surg*. 2006; 5(3):204-8.
 15. Büchler L, Tannast M, Bonel HM, Weber M. Reliability of radiologic assessment of the fracture anatomy at the posterior tibial plafond in malleolar fractures. *J Orthop Trauma*. 2009; 23(3):208-12.
 16. Obrebsky WT, Dirschl DR, Crowther JD, Craig Iii WL, Driver RE, LeCroy MC *et al*. Change over time of SF-36 functional outcomes for operatively treated unstable ankle fractures. *Journal of orthopaedic trauma*. 2002; 16(1):30-3.