

Original Research Article

Functional outcome after surgical treatment of ankle fracture using Baird Jackson score

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ABSTRACT

Background: Ankle fractures have been identified as a significant source of morbidity for both the young and the elderly. In this study we aim to evaluate the functional outcome of patients who were operated for ankle fracture at our centre and to assess the factors associated with the functional outcome.

Methods: An observational study in the Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka from January 1, 2017 till December 31, 2017 of all patients who presented with any type of ankle malleolar fracture and underwent surgery were included in the study. Clinical history, socio-demographic profile, anatomic classification and Weber's classification was noted for all patients. Functional outcome was evaluated 6 months post-operatively using the Baird Jackson scale and factors associated were assessed.

Results: During the study period 84 patients were enrolled in the study, mean age was 43.8 ± 5.46 years and 48 were male patients. Supination external rotation was the most commonly seen injury in our patient population. Postoperatively, superficial skin infections were seen in 15% and restricted ankle movement in 11% patients. According to the Baird and Jackson score, clinical functional outcome was excellent in 17 cases, good in 47, fair in 15 and poor in 5 patients. Patients aged less than 45 years and supination external rotation injuries were significantly associated with excellent and good functional outcomes as compared to patients of older age.

Conclusions: Surgical treatment resulted in excellent to good functional outcome in majority of the patients of this study. Further research is required to assess the clinical and functional outcomes in patients with long term follow up.

Keywords: Ankle fracture, Outcome, Malleolar fracture

INTRODUCTION

Musculoskeletal injuries put an enormous economic burden on society because of their high incidence and associated morbidity and mortality. Ankle fractures are among the most common joint injuries of the lower extremity, and have been identified as a significant source of morbidity for both the young and the elderly. Especially among the elderly, who have a number of comorbidities, ankle fractures are becoming increasingly common. Previously published studies have demonstrated a significant increase in the incidence and severity of ankle fractures among the elderly population.^{1,2}

Closed management with manipulation, though avoids the operative risks, can result in poor long-term outcomes.^{3,4} This contributes to significantly higher rates of mal- and non-union and decreased ankle range of motion. On the other hand, open surgical intervention can restore articular congruence, while it naturally carries the various operative and post-operative risks. This is particularly important when treating the elderly population. In the elderly, perioperative risk, and post-operative complications from skin infections, and the concurrent risks due to the presence of comorbid diseases are higher. Studies have shown that numerous comorbidities like osteoporosis, peripheral vascular

disease, skin infections, diabetes and other elderly-related health issues could predispose the elderly to poor functional outcomes postoperatively.⁵ In this study we aim to evaluate the functional outcome of patients who were operated for ankle fracture at our centre and to assess the factors associated with the functional outcome.

METHODS

Study design and sample population

We conducted a hospital based observational study in the Department of Orthopedics, AJ Institute of Medical Sciences, Mangalore, Karnataka from January 1, 2017 till December 31, 2017. 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 syndesmotic injuries were, old neglected fracture and those patients who were medically unfit for surgery and or anesthesia were excluded from the study. Institutional ethics committee approval was sought before we started enrolling the patients.

Surgical technique

Under spinal anesthesia, patient was placed in supine position. The affected limb was prepared and surgical draping was done using the standard methods. Using standard protocol, the operative approach for the fixation of the lateral malleolus was done. Soft tissue interposition between fracture fragments of the medial malleolus, was observed in all cases. All the patients were operated under tourniquet control and the duration of surgery varied from 45 minutes to 90 minutes. The medial malleolus was fixed with cannulated cancellous screws, or tension band wiring. The lateral malleolus was fixed with tubular locking plates with or without syndesmotic screws. Closure of the operative wound was done according to the standard protocol. Dressing with adequate padding and a below knee plaster of Paris was applied. Sutures were removed and crepe bandage was applied in the outpatient clinic at the end of two weeks, followed by removal of the plaster at the end of one month. With the help of radiographs healing status was judged and full weight bearing was started gradually. At the end of 6 months, patients were evaluated for functional outcome using the Baird and Jackson criteria.⁶

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 was 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 Weber's classification was done in all patients. Weber ankle fracture classification is a simple system for classification of lateral malleolar fractures, relating to the level of the fracture in relation to the ankle joint.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 analyzed 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 84 patients were enrolled in the study, mean age was 43.8 ± 5.46 years; 48 were male patients and 36 were females. Right side fractures were more common and road traffic accidents were the most common mode of injury (Table 1).

Table 1: Baseline characteristics of patients included in the study.

Number of patients	84
Average age (standard deviation)	43.8 (± 5.46) years
Males	48
Affected side	
Right	52
Left	32
Mode of injury	
Road traffic accidents	43
Domestic falls	27
Sports injuries	14
Mechanism of injury	
Supination external rotation	38
Supination adduction	21
Pronation abduction	4
Pronation external rotation	15
Pronation dorsiflexion	6
Anatomical classification of fractures	
Bimalleolar fracture	49
Lateral malleolar fracture	14
Medial malleolar fracture	15
Trimalleolar fracture	6
Weber's classification	
A	14
B	49
C	21
Post-operative complications	
Superficial skin infection	13
Restricted ankle movement	8

Table 2: Functional outcome using Baird and Jackson score.

Outcome	Number of cases
Excellent	17
Good	47
Fair	15
Poor	5

Supination external rotation was the most commonly seen injury in our patient population. Less common mode of injuries were supination adduction and pronation external rotation. Bimalleolar fracture was the most common anatomic type of fracture. According to Weber's classification, type B was the most type. The medial malleolus was fixed with cannulated cancellous screws in 52 cases and with tension band wiring in 12 cases. 58

cases with lateral malleolus fracture were fixed with tubular locking plates and another 5 cases were fixed using syndesmotic screws through tubular locking plates. Postoperatively, superficial skin infections were seen in 15% and restricted ankle movement in 11% patients. According to the Baird and Jackson score, clinical functional outcome was excellent in 17 cases, good in 47, fair in 15 and poor in 5 patients. Patients aged less than 45 years were significantly associated with excellent and good functional outcomes as compared to patients of older age ($p < 0.001$). Supination external rotation was also found to be significantly associated with excellent and good functional outcomes ($p < 0.01$). Gender of the patients was not found to be significantly associated with the functional outcome according to the Baird and Jackson score.

Table 3: Association of patient variables with clinical outcomes.

Variables	Functional outcome using Baird and Jackson score				P value
	Excellent	Good	Fair	Poor	
Age (years)					
21-45	14	32	13	0	<0.001
46-70	7	12	6	0	
Gender					
Males	22	19	5	2	>0.05
Females	14	11	8	3	
Mechanism of injury					
Supination adduction	5	8	5	3	<0.01
Supination external rotation	10	17	9	2	
Pronation external rotation	2	7	5	1	
Pronation abduction	0	1	2	1	
Pronation dorsiflexion	0	2	1	3	

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. We had ankle stiffness in eight patients. Noncompliance of the patient to physiotherapy regimen which was advised to all patients in the follow up period could be the reason for this. We did not monitor or collect information regarding physiotherapy of the ankle joint after discharge. In our study we did not note 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 13 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 thinner plates or fibular nailing may also affect the overall outcome.^{13,14}

There were some limitations of this study. Firstly, the relatively small sample of patients who underwent

operative treatment for ankle fracture. 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 was 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 followed up ankle fractures for 20 months, only after which the patients demonstrated significant improvement in pain and function.¹⁶

CONCLUSION

Surgical treatment resulted in excellent to good functional outcome in majority of the patients of this study. The results of our study show that younger patients have better postoperative functional outcomes. Ankle fractures which happened due to the supination external rotation injury were also found to be significantly associated with excellent and good functional outcomes. Further research is required to assess the clinical and functional outcomes in patients with long term follow up.

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