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Dr. Mohan Kumar C R
Department of Orthopaedics
Father Muller Medical College,
Hospital Karnataka, India

Dr. Vivian R D' Almedia
Department of Orthopaedics
Father Muller Medical College,
Hospital, Karnataka, India

Dr. Abey Thomas Babu
Department of Orthopaedics
Father Muller Medical College,
Hospital Karnataka, India

Dr. Terence D' Souza
Department of Orthopaedics
Father Muller Medical College,
Hospital Karnataka, India

To assess the clinical outcome of ankle fractures with regards to the demographic variables and the quality of reduction of the fractures

Dr. Mohan Kumar CR, Dr. Vivian RD' Almedia, Dr. Abey Thomas Babu and Dr. Terence D' Souza

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Abstract

Background: Ankle fractures are among the most common injuries. Severe injury combined with inadequate or inappropriate treatment can lead to severe complications and major disability. As a result, early treatment without delay, anatomical reduction and fracture fixation, stringent postoperative mobilization and rehabilitation should help improve outcome in an operated ankle fracture.

Materials and Methods: A total of forty five patients with the ankle fractures admitted from June 2015 to February 2016 under Department of Orthopaedics, were included in the study.

Results: The most common mode of injury was road traffic accidents. The most common modality of fixation for the lateral malleolus was 1/3rd tubular plate, and for the medial malleolus was with 4 mm cannulated cancellous screws with washers. The patients were reviewed at three and six months postoperatively. There was a statistically significant improvement in the subjective assessment of pain and activity levels from 3 months post-op to 6 months post-op.

Conclusion: Early treatment without delay, anatomical reduction and fracture fixation, stringent postoperative mobilization and rehabilitation should help improve outcome in an operated ankle fracture.

Keywords: Fractures, reduction, mobilization, outcome

Introduction

Ankle fractures are among the most common injuries treated by orthopaedic surgeons. The ankle is a precisely aligned joint with little soft tissue coverage. As a result, severe injury combined with inadequate or inappropriate treatment can lead to severe complications and major disability.

The ankle is not intrinsically stable in any position and requires support from the muscles that cross it ^[1, 2, 3]. Therefore anatomic restoration of the joint is the goal of management in fractures about the ankle. Open reduction and internal fixation is the standard of care for unstable ankle fractures ^[4]. However very few investigators have examined the functional recovery following operative treatment of ankle fractures ^[5].

Aims and Objectives

To assess the clinical outcome of ankle fractures with regards to the demographic variables and the quality of reduction of the fractures.

Materials and Methods

A prospective randomized study was carried out in Father Muller Medical College, Mangalore, from June 2015 to February 2016 and all the patients who fulfilled the below mentioned inclusion criteria were included in the study.

Inclusion Criteria

1. Cases of closed bimalleolar and trimalleolar ankle fractures
2. Skeletally mature patients above 18 years of age
3. Entire definite treatment done in our institution
4. Patients who comply with regular follow up for a period of at least 6 months

Correspondence

Dr. Mohan Kumar C R
Department of Orthopaedics
Father Muller Medical College,
Hospital Karnataka, India

Exclusion criteria

1. Children below 18 yrs.
2. Patients who lost to follow up.
3. Multiple trauma or other injuries.
4. Open fractures.
5. Neurovascular injuries.

Patients were initially assessed in the emergency department, appropriate radiological and laboratory investigations were carried out and patients who satisfied the inclusion criteria were considered for the study. The fractures were classified according to the Lauge-Hansen system.

All patients underwent surgical fixation of the fractures, and post-operatively were put on a plaster of paris (POP) slab. Post-operative antibiotics were continued for a period ranging from 3 to 5 days depending on the presence of other injuries and therapy was prolonged if there were signs of infection. Initial wound inspection was done on the third postoperative day. Once pain free, patient was trained in non-weight bearing crutch walking. The slab was continued till suture removal following which the patients were advised dorsiflexion and plantar flexion exercises.

The patients were reviewed at three and six months postoperatively and subjective and objective assessment of the patients' ankles were done using a modification of the scoring system proposed by Olerud and Molander.

Operative procedure

Under spinal anaesthesia the patient was put in supine position on table with sand bag underneath the affected side buttock. Pneumatic tourniquet was applied to the proximal thigh, prophylactic antibiotics were given prior to inflation of the tourniquet. The affected limb was scrubbed with chlorhexidine gluconate solution from the knee joint to the nail tip and then painted with betadine solution and spirit, and draped.

Open reduction and internal fixation of the malleolar fractures were performed by tension band wiring, 4 mm cannulated cancellous screws with washers, semi tubular plating with screws or with an intra-medullary device.

Internal Fixation of the Lateral Malleolus

The lateral malleolus was approached through a posterolateral incision. Reduction of the fracture was done by reversing the force that caused the fracture. Fixation of the fracture was done using 1/3 tubular plate with or without a lag screw.

Fixation of the Medial Malleolus

A medial longitudinal incision was put over the medial malleolus between its anterior and posterior borders. The fracture was fixed by passing one or two 4 mm cannulated cancellous screws with washer, or by tension band wiring depending on the configuration and size of the fracture fragment.

Posterior lip fractures

Reduction of posterior lip fragments was done indirectly through either posteromedial or posterolateral incisions. Posterior lip fragments were reattached with one or two lag screws, occasionally supplemented with K-wires, washers.

Syndesmotic injury

Syndesmosis stability was checked by laterally displacing the distal fibula from the tibia while observing the relationship of the two bones. If more than 3 to 4 mm of lateral shift of the talus occurs, instability is present. However in this study none of the patients had syndesmotic fixation done.

Statistical analysis

Descriptive statistical analysis was carried out in the present study. Significance was assessed at 5 % level of significance. Student t test (two tailed, independent) was used to find the significance of study parameters on continuous scale between two groups. Intergroup analysis on metric parameters, Chi-square/Fisher Exact test was used to find the significance of study parameters on categorical scale between two or more groups.⁶

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, Medals 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data.

Results

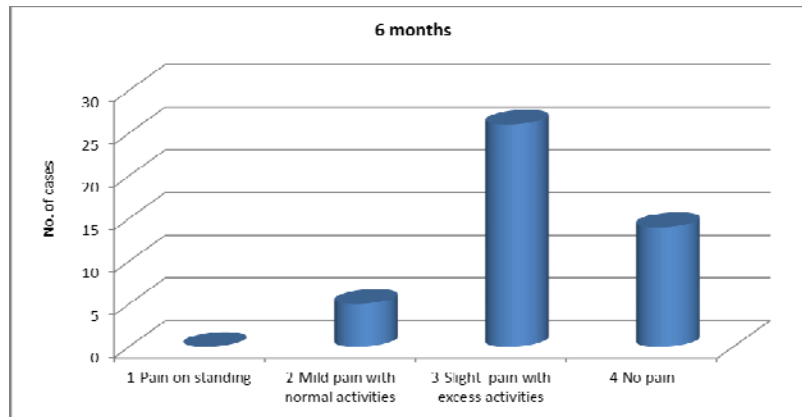
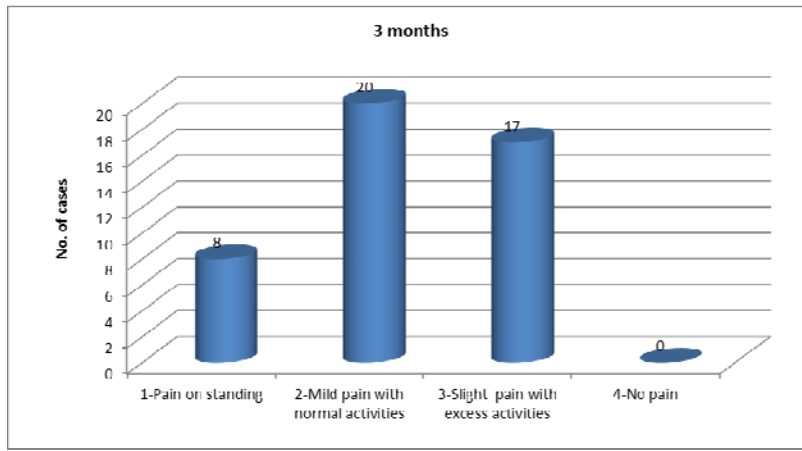
The study consisted of 45 patients aged between 17-73 years, of which 17 were females and 28 were males. Eighteen patients had left ankle fracture, twenty-six had right ankle fracture, whereas one patient had bilateral involvement. The most common mode of injury was road traffic accidents.

Eight patients had local wounds in the form of abrasions and lacerations. Skin condition was not found to be good in 5 patients. The most common injury pattern seen was supination external rotation followed by supination adduction and pronation external rotation.

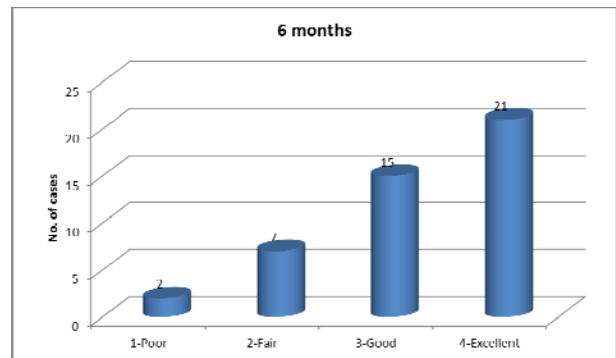
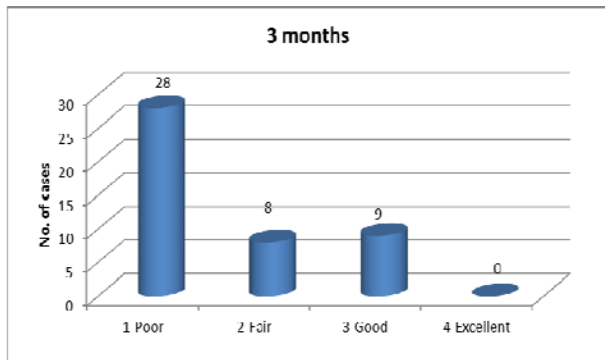
The most common modality of fixation for the lateral malleolus was 1/3rd tubular plate, and for the medial malleolus was with 4 mm cannulated cancellous screws with washers. Syndesmotic screws were not used in any of the cases. The average duration of hospital stay was 13 days.

Eight patients had superficial wound infection, which was managed with appropriate antibiotics and dressings. The infection resolved in all cases.

On follow up at 3 months, 11 out of 45 patients had persistent residual pain and one patient was found to have loss of reduction, which was attributed to early weight bearing against medical advice. There was a statistically significant improvement in the subjective assessment of pain and activity levels from 3 months post-op to 6 months post-op. However subjective radiographic assessment failed to show any statistically significant improvement from 3 months post-op to 6 months post-op.



The mean Olreud and Molander Ankle score at 3rd month post op was 47.5 ± 17.9 and at 6th month post op was 81.7 ± 16.2 . There was a statistically significant improvement in the scores from 3rd month to 6th month post-op (p value 0.000).



On studying the relationship between age of the patient and the Olreud and Molander Ankle score, it was noted that there is a significant association between age and the OMA score with advanced age being associated with a lower OMA score both at 3rd month and 6th month post-op (p value 0.002).

Age	6 months			Total
	bad	fair	good	
20 and below	1 25.0%	0 .0%	3 75.0%	4 100.0%
21 - 30	0 .0%	0 .0%	10 100.0%	10 100.0%
31 - 40	0 .0%	1 20.0%	4 80.0%	5 100.0%
41 - 50	0 .0%	4 23.5%	13 78.5%	17 100.0%
51 - 60	0 .0%	2 40.0%	3 60.0%	5 100.0%
Above 60	0 .0%	3 75.0%	1 25.0%	4 100.0%
Total	1 2.2%	10 22.2%	34 75.8%	45 100.0%

Age		6m omae				Total
		poor	fair	good	excellent	
20 and below		1	0	0	3	4
		25.0% 50.0%	0% 0%	0% 0%	75.0% 14.3%	100.0% 8.9%
21 - 30		0	0	1	9	10
		0% 0%	0% 0%	10.0% 6.7%	90.0% 42.9%	100.0% 22.2%
31 - 40		0	1	2	2	5
		0% 0%	20.0% 14.3%	40.0% 13.3%	40.0% 9.5%	100.0% 11.1%
41 - 50		0	2	9	6	17
		0% 0%	11.8% 28.6%	52.9% 60.0%	35.3% 28.6%	100.0% 37.8%
51 - 60		0	3	1	1	5
		0% 0%	60.0% 42.9%	20.0% 6.7%	20.0% 4.8%	100.0% 11.1%
Above 60		1	1	2	0	4
		25.0% 50.0%	25.0% 14.3%	50.0% 13.3%	0% 0%	100.0% 8.9%
Total		2	7	15	21	45
		4.4% 100.0%	15.6% 100.0%	33.3% 100.0%	46.7% 100.0%	100.0% 100.0%

In our study we also found a significant association between presence of complications and final OMA score. Patients who had post-op complications were found to have lower OMA scores at 3 months and 6 months follow up (p value 0.001).

Discussion

A significant improvement was noted in the ankle function from 3rd month to 6th month post-op, assessed using subjective criteria as well as the Olreud and Molander Ankle score. This is concordance with a study done by Nilsson et.al, who in his evaluation of 54 patient with ankle fractures noted the mean Olreud and Molander ankle score to be 75 at 14 months post-op [7].

Age was a significant predictor of the final outcome, with younger patients having a better outcome. Loss of reduction can lead on to complications such as malunion of the fracture and would need further corrective surgery. This is in concordance with a similar study done by Hong et.al in 2014 in which he reported residual pain, swelling and ankle stiffness as the most common complications at 1 year follow up [8]. Operative treatment for ankle fractures results in good functional outcome post-operatively. Anatomical reduction and surgical fixation of the fracture leads to a better functional outcome. Patient satisfaction with regard to pain, deformity and stability was significantly better [9].

The study had the following limitations: The study group was relatively small, with a shorter duration of follow up. Variations in surgical techniques and experience, fracture patterns, errors of measurement and patient adherence to postoperative mobilization regimens could not be accounted for in this study.

Conclusion

Early treatment without delay, anatomical reduction and fracture fixation, stringent postoperative mobilization and rehabilitation should help improve outcome in an operated ankle fracture [10]. Immediate open reduction and internal fixation in ankle fractures yield good results in terms of anatomical reduction, stability and Post Op functional return. Early return of ankle movements Post OP with proper rehabilitation improved functional outcome. After a year of surgery, most patients experience little or mild pain and have certain restrictions of functional activities.

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