Original Paper

Treatment and Outcome of Ankle Fractures at the Moi Teaching and Referral Hospital

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Abstract

Background: Ankle fractures are common and protocols for their management are generally well established. Despite this, a significant proportion of the patients get unfavourable outcomes after being managed for this injury. This study looked at the treatment options offered and their outcome at our unit. **Methodology**: A prospective study was conducted to examine ankle fracture patients presenting at our unit from 1st November 2009 to 30th April 2011. All patients were followed up was for 6 months where clinical and radiological evaluations recorded to determine outcome. **Results**: The mean age of patients was 47years with the ratio of female to male being 1.5:1. An infection rate of 10% in patients treated by ORIF and 33.3% in open fractures was documented. At 6 months follow up, there was a higher rate of complications in the unstable fractures treated non-operatively (92.3%) compared to unstable fractures treated surgically (37.7%) ($p<0.001$). **Conclusion**: The rate of infection after surgical management was high and measures are required to mitigate this. The unstable ankle fractures treated non-operatively have a high rate of complications and should be managed operatively.

Key Words: Ankle fractures, Treatment outcome, Developing country

Background

Ankle fractures are among the most common injuries treated by orthopaedic surgeons; the second most frequent injuries after fractures of the distal radius (1). The incidence of ankle fractures has been on the increase according to population studies (2, 3). Ankle fractures excluding pilon fractures, currently account for approximately 9% of all fractures (4). Despite guidance by treatment protocols, surgeons still face unfavorable treatment outcomes. The injury makes patients unproductive in terms of loss of man hours and income. High expenditure is also incurred on hospital bills. Moi Teaching and Referral Hospital (MTRH) cares for a large number of ankle fracture patients yet no studies had been conducted on this subject at this institution. We noted patients presenting with unfavorable ankle fracture outcomes during follow-up in our routine outpatient orthopaedic clinic. This study reviewed the management offered to patients and outcome of ankle fractures with an aim to bridge the knowledge gap that may be responsible for unfavorable outcome.

Materials and Methods

We conducted a prospective study at MTRH from 1st November 2009 to 30th April 2011. Recruitment of new participants was done up to 31st October 2010 and each patient was followed up for 6 months. We included all the patients with ankle fractures evaluated, treated and followed up at MTRH who consented to the study. All patients were followed up at the wards prior to discharge and at the clinics as outpatients. At each follow-up visit both clinical and radiological evaluations were recorded using a questionnaire by the registrar on duty. Variables collected included patient's age, contact details, gender, cause of injury, co-morbidities, management offered, clinical and radiographic findings.

All patients were reviewed and management decided by the orthopaedic surgeon on call. Ankle fractures were grouped as unstable if there was talar shift shown on either anteroposterior (AP) or lateral views of the ankle radiographs whereas stable fractures had no talar shift. The management offered for closed fractures included open reduction and internal fixation (ORIF) and application of a Plaster of Paris cast (POP) for unstable fractures, closed reduction and application of POP for some displaced unstable fractures, closed reduction and POP for some displaced stable fractures and POP application without reduction for undisplaced fractures. Open fractures were treated by surgical debridement and irrigation with sterile normal saline, reduced and stabilized with external fixators. Fractures with associated dislocation or subluxation of the ankle joint had immediate reduction and splinting at the emergency room awaiting definitive treatment as detailed above. Two radiographs (AP and lateral) were taken immediately after management and at the 2nd, 6th, 12th and 24th weeks of follow up for all patients. Displaced injuries treated by closed reduction and application of POP were initially followed up with weekly radiographs. If the reduction was lost during follow up, patients were considered for repeat closed reduction or ORIF.

All patients in the operative and non-operative groups were trained to ambulate non weight bearing in the cast for a minimum of 6 weeks. Physical therapy during the recovery phase was given and aimed at the patient regaining full range of motion, strength, and proprioceptive abilities.

Data was then entered and stored in a computer for subsequent analysis. SPSS version19 was used for data analysis. Inferential statistics assumed a 95% confidence interval and a test significance value at ≤ 0.05.

Results

A total of 48 patients were included in this study. The age of the patients ranged from 22 – 75 years with a mean age of 47 years. Ankle fractures occurred more in females than in males with a ratio of 1.5:1. Majority (75%) of the cases were as a result of falls, Road Traffic Crashes constituted 18.7% of the burden, while assaults and being hit by an object constituted the rest. Out of the 48 patients with ankle fractures 3 (6.25%) had open injuries. Talar shift was documented in 32(66.7%) of the patients. There was a mean delay of 2.7 days from injury to surgical debridement for open ankle fractures.

Insert table 1 here

Open Reduction and Internal Fixation (ORIF) was performed for 16 unstable closed fractures of which 14 were fixed with plates and screws and 2 with malleolar screws (Table 1). The 2 ankle fractures treated with malleolar screws were unstable because they had associated lateral malleolar tip avulsion with medial talar shift. Out of these 16 fractures 2(12.5%) developed infection.

Out of the 29 ankle fractures treated non-operatively 13 were unstable fractures. The reasons for non-operative treatment of these unstable fractures were: 3 of them declined surgery while 10 could not meet the cost of surgery. A high number, 9 (69.2%), out of the 13 unstable fractures treated non-operatively re-displaced in the cast.

Insert Table 2 here

At 3 months 36 of the 48 patients treated for ankle fractures reported a complication and only 12 (25%) of these patients were free of any complication and returned to their normal pre injury state. Pain was reported in 11 (84.6%) of the 13 unstable fractures treated non-operatively. Out of the 16 stable ankle fractures treated non-operatively, ten reported a complication at 3 months follow up with only 3 (18.8%) of them reporting pain. The unstable fractures treated non-operatively had the highest rate of complications at 3 months (Table 2).

Insert Table 3 here

At 6 months, 25 patients (52.1%) out the 48 treated for ankle fracture presented with various complaints. Out of the 13 unstable treated non-operatively, 12 (92.3%) reported a complaint at 6 months. A high proportion (77%) of the 13 unstable fractures treated non-operatively still had pain at 6 months. Only 3 (21.4%) of the 14 unstable ankle fracture treated by ORIF had ankle pain at 6 months. Out of the 16 stable ankle fractures treated non-operatively only 2(12.5%) reported pain at 6 months (Table 3).

Insert Table 4 here

The unstable ankle fractures treated non-operatively had a significant higher rate of complications (92.3%) compared to the unstable fractures treated by ORIF (37.5%) at 6 months ($p<0.001$). All the 3 unstable open ankle fracture patients had various unfavourable symptoms and signs at 6 months of follow up.

Discussion

Classifying ankle fractures based on stability as a guide to the most appropriate treatment has been described (5). When the talus is dislocated, subluxated or has a significant tilt, the ankle fracture is considered unstable. When radiographs reveal a fibula fracture and the talus has not shifted, further information is required before deciding that the injury is stable (5, 6). Stable fibula fractures have little or no medial side injury. In stable ankle fractures, the talus is centered and does not shift with light stress. In unstable ankle fractures, the talus is either not centered or shifts with light stress.

In this study 32 (66.7%) out of the 48 ankle fractures had talar shift making them clearly unstable injuries. All the 13 (27%) fractures treated by closed reduction and POP had a talar shift. Appropriate treatment for all unstable ankle fractures would have been ORIF since the unstable fractures treated by ORIF had a comparatively significant better outcome.

Out of the 16 closed ankle fractures treated by ORIF 2 (12.5%) developed infection and 1 (33.3%) out of the 3 patients with open injuries developed infection. This is a high rate of infection compared to reports in literature of about 1% in closed fractures treated by ORIF and less than 10% for open fractures (7). A mean of 2.7 days from the time of injury to surgical debridement and irrigation was documented for open ankle fractures in this study. The current consensus favours early surgery within the first twenty four hours and the use of antibiotic prophylaxis (8, 9). Ceftriaxone was used in the closed fractures undergoing ORIF for prophylaxis as it was the only drug available. However, first-generation cephalosporins are preferred and should be used for a maximum of 48 hours post operatively (9).

Many studies have investigated outcome after ankle fracture and many different outcome measures are used to determine the different aspects of the final result. Some have used

radiographic outcome, clinical measurements such as range of motion, scales of subjective symptoms, or a combination of these (10). Outcomes are often classified as ‘‘good’’ or ‘‘poor,’’ but these descriptors provide little information and are based on varying criteria (11). Symptoms and signs commonly associated with unfavourable outcome after ankle fracture include pain, instability, swelling, reduced function (particularly with stairs or uneven surfaces), decreased range of motion, and early development of osteoarthritis (10). In this study rates of complications (signs and symptoms associated with poor outcome and radiographic outcome) were used. The unstable fractures treated non-operatively had the highest rate of complications at both 3 and 6 months of follow up. Stable ankle fractures that did not require manipulation and were treated by POP application had the lowest rate of complications. This treatment outcome is comparable to many reported outcomes in literature where good to excellent results are reported in about 95% of the cases (12). In this study 8 (61.5%) of the 13 unstable fractures treated non-operatively ended up with malunion after loss of reduction. Although suggested by some authors in the literature, closed reduction and immobilization in POP of unstable fractures is consistently reported to give unsatisfactory results (13,14). There is some evidence to suggest that among patients whose fractures are successfully reduced initially by closed reduction, a relatively large proportion will lose reduction and go on to malunion or nonunion if treated non operatively. From the literature, loss of position after manipulation ranges from 16.4 to 48%. Malposition after internal fixation, due to loss of position or inadequate reduction ranges from 7.9 to 13% (15). This study reported malunion in 1case (6.3%) of the unstable fractures treated by ORIF. Other investigators have found that operative intervention leads to improved outcomes compared with non operative treatment. Makwana and colleagues conducted a prospective randomized trial of 47 patients with displaced ankle fractures and found significantly higher functional outcome scores, greater ankle range of motion, and less swelling in patients who were treated operatively than in those treated non-operatively (11). In addition, patients who were treated with cast immobilization were less likely to have an anatomic reduction and more likely to lose their reduction during the treatment course (11). A retrospective review of 100 ankle fractures in patients older than 60 years found the rates of nonunion and malunion to be significantly higher after conservative treatment; while patients treated operatively had a higher level of satisfaction than their non operative counterparts (16).

Post traumatic impingement, occult tendon injuries, articular surface disruptions, synovitis and nerve injury are documented as possible causes of persistent symptoms in ankle injury victims and require special tests like Magnetic Resonance Imaging, ankle arthroscopy and nerve conduction studies to diagnose (23, 24). These special tests were not available at MTRH and therefore we could not evaluate whether any of those conditions was associated with the acute ankle fractures and possibly be a cause of the documented persistent symptoms.

Conclusion and recommendation

A high proportion of closed ankle fractures treated by ORIF as well as open ankle fractures at MTRH were complicated by infection. This study did not demonstrate the cause of the high

infection rate and we recommend an investigation to establish the cause which may guide the alleviation of this complication. The unstable ankle fractures treated non-operatively by closed reduction and POP application had an unacceptably high rate of complications and should have been treated by ORIF. We therefore recommend operative treatment for unstable ankle fractures.

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Table 1: Modes of treatment offered for the ankle fractures in this study

Treatment offered		Frequency
Non operative treatment	Closed reduction + POP	13
	POP/closed reduction + POP	16
Operative treatment	Malleolar screws	2
	Plating and screws	14

	Debridement &External fixator	3
	Total	48

Table 2: Symptoms and signs commonly associated with unfavourable outcome at 3 months

Outcome	Treatment given					Total N =48
	Closed reduction & POP n =13	External fixator n =3	Malleolar screws n =2	Plating and screws n =14	POP/closed reduction & POP n =16	
pain	11	2	0	5	3	21
instability	7	1	0	1	1	10
stiffness	8	2	0	3	3	16
malunion	8	1	0	1	0	10
non union	4	1	0	1	1	7
osteoarthritis	0	0	0	0	0	0
swelling	11	3	1	9	7	31
deformity	7	1	0	0	0	8
Total no. of patients presenting with complaint/s	13	3	1	9	10	36

Table 3: Symptoms and signs associated with unfavourable outcome at 6 months

outcome	Treatment given					Total N =48
	Closed reduction & POP n =13	External fixator n =3	Malleolar screws n =2	Plating and screws n =14	POP/closed reduction & POP n =16	
pain	10	1	0	3	2	16
instability	6	1	0	0	1	8
stiffness	8	1	0	2	1	12
malunion	8	1	0	1	0	10
non union	4	1	0	1	1	7
osteoarthritis	3	1	0	1	0	5
swelling	10	2	0	6	5	23
deformity	7	1	0	0	0	8
Total no. of patients presenting	12	3	0	6	4	25

with complaint/s						

Table 4: Summary of fracture type, treatment and outcome based on rate of complications at both 3 and 6 months

Type of ankle fracture		Frequency	Treatment offered	Rate of complications at 3 months	Rate of complications at 6 months
Stable	closed	16	Non operative (POP)	62.5%	31.25%
Unstable	Closed	13	Non operative (closed manipulation & POP)	100%	92.3%
		16	ORIF (plate and screws)	62.5%	37.5%
	Open	3	External fixator	100%	100%