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Original Article

Outcomes and Pattern of Bimalleolar Ankle Fracture in Adults: A Cross-Sectional Study

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ABSTRACT

A total of 10% of all bone fractures are found in the ankle, making it the most often broken bone in the body. **Objective:** To assess the outcome and the pattern of bimalleolar ankle fractures in adults. **Methods:** A total of 72 individuals with bimalleolar ankle fractures were recruited in this study and followed up for a total of 12 weeks. An evaluation of the results after 12 weeks was done using the American Orthopedic Foot and Ankle Score & the Visual Analog Pain Scale. The amount of discomfort, functional ability, and alignment were the three key indicators of the results. **Results:** The average age of the patients was 36.4 10.4 years, ranging from 19 to 60 years. There were 3:2 more men than women. Half of the fractures were due to falls, 36.1% by automobile accidents, and 13.9% by motorcycle accidents. Of the cases, 63.9 percent included closed fractures. According to the Weber classification, B and C fractures were the most frequent, occurring in 33 (45.8%) and 31 (43.1%) individuals, respectively. The mean AOFAS at three months was 78.2. Between 1 and 3, the VAS was 43.1%. 38.8% of the patients, or 28, reported no discomfort. **Conclusions:** Patients tended to be young in this study. Delaying final care for up to a week after a fracture does not seem to have a negative impact on the result. The medial clean space (less than 4mm) was the primary indicator of a successful result.

INTRODUCTION

A total of 10% of all bone fractures are found in the ankle, making it the most often broken bone in the body. It is anticipated that there would be a threefold rise in the total number of cases over the course of the next 15 years. Bimalleolar fractures account for twenty-five percent of all ankle fractures, and the hospital treats twelve patients with bimalleolar fractures on a monthly basis, on average. Both surgical and non-surgical treatment options are available for patients with bimalleolar fractures. The ankle joint is a kind of synovial joint that is a mortise and tenon joint, and it has a uniaxial functional orientation. The medial, lateral, distal tibiofibular, cross-joint, tendons, bone forms, and capsular attachments all support the ankle [1]. Both the medial malleolus of the distal tibia and

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the lateral malleolus of the distal fibula are damaged in a bimalleolar fracture of the distal tibia and fibula [2,3]. Bimalleolar ankle fractures affect medial and lateral ankle joint structures. These fractures originate from indirect translational, axial, and rotational forces. These induce the talus to dislocate from the ankle mortise [4]. The Anteroposterior (AP), Mortise, and Lateral views are included in the typical ankle radiographs [5]. In a 30-year period, people over the age of 60 years had a considerable increase in the number as well as the frequency of ankle fractures that were caused by low-impact trauma: Total fractures doubled from 369 in 1970 to 1545 in 2000, and incidence increased from 57 to 150. By the year 2030, it is predicted that the number of these fractures would have tripled [1]. Two-thirds of ankle fractures are solitary malleolar fractures, with 25 percent of patients experiencing bimalleolar fractures and the remaining 5 to 10 percent experiencing trimalleolar fractures [2]. The current study was planned to assess the outcome and the pattern of bimalleolar ankle fractures in adults.

METHODS

This was a cross-sectional study on patients with bimalleolar ankle fractures. Permission was taken from the ethical review committee of the institute. All patients with solitary bimalleolar fractures who received treatment at Hospital within three weeks of the incident met the inclusion criteria. Radiographs, at least the anteroposterior and lateral views, were done on patients who had isolated ankle injuries. Bimalleolar fracture sufferers were included in the research and monitored. The age and gender of the patients were noted on a proforma. Weber A, B, or C classification was given to fractures. As the patients returned for evaluation at the fracture clinic, the modality of therapy was tracked down for them. Evaluations were conducted at 2, 6, and 12 weeks. The ORIF group was evaluated at two weeks for surgical site infection as well as the maintenance of reduction, at six weeks for clinical and radiological union, and at twelve weeks for the administration and documentation of the Visual Analog Pain Scale as well as the American Orthopaedic Foot and Ankle Score.

RESULTS

Patients between the ages of 30 and 39, represented by n = 22, followed by patients between the ages of 19 and 29 by 24 (33.8%) patients. A total of 64.8% of the patients belong to these 2 categories. Male patients experienced the majority of bimalleolar fractures (42, or 58.3%). The male to female ratio was almost 3:2, with 30 (41.7%) of the patients with bimalleolar fractures being female. 62 percent of the patients had involvement of the right limb. (n=46) Of the total fractures, 63.9 percent were closed. Weber B and C fractures were the most frequent, occurring in 45.8% and 43.18% of cases, respectively. While 58 (84.1%) of the tibial fractures were transverse, 50% of obliquetype fibular fractures. The most common cause of bimalleolar fractures was falls (50 percent). One Weber A fracture was open, seven Weber B fractures were closed, twelve Weber C fractures were closed, and thirteen were open. Weber A, B and C fractures were among the 35 surgically treated fractures as shown in table 1.

Bimalleolar fracture	Frequency (%)
Fractured limb	
Left	27(38%)
Right	44(62%)
Injury type	
Closed	46(63.9%)
Open	26(36.1%)
Fracture's weber classification	
A	8(11.1%)
B	33(45.7%)
C	31(43.1%)
Fracture of tibia	
Comminuted	2(2.9%)
Oblique	9(13%)
Transverse	58(84.1%)
Fibular fracture	
Comminuted	15(20.8%)
Transverse	21(29.2%)
Oblique	36(50%)

Table 1: Bimalleolar fractures are presented according to the site and type of fracture.

Indications for surgical treatment included fractures that were either open or displaced (defined as having a lateral displacement of more than 2mm), as well as dislocations. In 2 (5.7%) of the patients who had surgical management, a superficial surgical site infection was observed (As shown in Table 2).

Frequency (%)	
Non-operative	37(51%)
Operative	35(49%)
Infection at surgical site	
Yes	2(5.7%)
No	33(94.3%)
Radiologic and clinical union at week	
Yes	70(97.2%)
No	2(2.8%)

Table 2: Bimalleolar fracture patients' management and reevaluation

In 6 (8.3%) of the patients with radiographs at two weeks, there was a medial clear space more than 4mm. Three had been well managed. The other five were Weber C, and one was Weber B. No patients (VAS score ≥7) reported experiencing excruciating pain. Most patients, who gave pain ratings between 1 and 3, experienced very modest degrees of discomfort (43.1 percent). A total of 28 patients

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(38.8%) gave a pain score of 0, while 18.1% of participants felt significant pain. The level of pain reported by patients on the VAS did not differ significantly by manner of therapy (p = 0.759). In comparison, only fifty percent of patients whose medial clear space was more than four millimeters reported having VAS<3, whereas the vast majority of fifty-six patients whose medial clear space was between zero and four millimeters reported having VAS>3 (p = 0.034). At the hospital, patients with bimalleolar fractures had an average AOFAS score of 78.2 (SD 20.7), ranging from 17 to 100. Weber A, B, and C had mean AOFAS values of 96.6, 80.3, and 72.9, respectively as shown in Table 3.

	Mean ±SD	ANOVA	P-value
Treatment 'types			
Non-operative	85.6±17.5	12.28	0.001
Operative	69.6±20.6		
Treatment 'types			
<48hours	77.0 ±20.7	0.12	0.891
<7days	81.7±15.6		
>7days	77.7±21.8		
Injury types			
Open	68.3±21.1	10.65	0.002
Closed	83.8±18.4		
Treatment 'types			
A	90.6±12.9	2.77	0.070
B	80.3±21.2		
C	72.9±20.5		

Table 3: Average AOFAS scores by injury type and intervention

Patients receiving operational therapy as opposed to non-operative care had significantly different mean AOFAS scores (p 0.001), while participants with open injury as opposed to closed had significantly different scores (p 0.002). The patient's degree of education and AOFAS score were substantially correlated (p = 0.03). Patients with secondary education had an average AOFAS score, 15.5 points more than those with elementary education, according to an ANOVA analysis (p = 0.03), indicating that they had less discomfort. There was no difference between the secondary and tertiary level results (p = 0.435). Open and closed Weber B fractures, as well as surgical and non-operative ones, did not significantly vary from one another. With scores of 63 and 84.3, respectively, surgically treated Weber C fractures performed considerably worse than conservatively treated fractures. AOFAS score is shown in Table 4

Parameter	Clinical radiologic union	Median VAS	Mean AOSAF	p-value
	6week	12week	12week	
Open n=26				0.821
Weber A	1	-		
Weber B	12	2	68.3	
Weber C	13	3	66.3	
Closed n=42				
Weber A	6	1	90	
Weber B	21	0	87.1	0.121
Weber C	17	2	77.6	
Medial clear space				
Space <4(n=66)	64	2	80.2	0.008
Space >4(n=6)	6	3.5	57.2	
Treatment				
Operative (n=35)				0.117
Weber A	1	-	-	
Weber B	18	2	74.1	
Weber C	16	3	63	
Non-operative (n=37)				
Weber A	6	1	90	0.523
Weber B	15	0	87.7	
Weber C	14	1	83.4	

Table 4: Clinical pain ratings using the AOFAS and the VAS, as well as Weber-classified clinical outcomes

DISCUSSION

In this study most patients were under 40 years of age and were males. RTAs and falls caused 50% of fractures. Contrary to Caucasian research, where most fractures were caused by falls and largely women, other studies showed a preponderance of RTAs as the leading factor for fractures, with most being males [6-8]. It was consistent with studies from Nigeria and South Africa that found falls to be the primary cause of 53 percent of injuries and 46.3 percent of ankle fractures, respectively. Due to socioeconomic inequality, at-risk road users including cyclists, pedestrians, and passengers of buses and minibuses, road accidents are a typical occurrence in third-world nations [9,10]. In contrast to Caucasian research, where open bimalleolar fractures were less than 5%, there were 26 open fractures, or 36% of total fractures [11]. It's possible that this has something to do with the underlying cause of the fractures; although the majority of ankle fractures in Caucasians were caused by low-energy falls, the fractures in Pakistanis were caused by high-energy trauma. According to prior research conducted by Hughes, Reuwer, and Schweiberer, the Weber B fracture was shown to be the most common kind of fracture, accounting for 45.8 percent of all cases [12,13]. A total of 49% of participants were treated surgically. These participants suffered open fractures and displaced Weber B and C injuries. The AOFAS score did not significantly vary between the surgically treated and non-treated Weber B fractures. However, compared to non-surgical Weber C fractures, operational bimalleolar (Weber C) fractures had a significantly lower score. The syndesmotic damage or the severity of the injury may have contributed to the poor operative AOFAS score rather than the operational procedure. Operationally treated fractures were likely to have severe, displaced, comminuted ankle injuries. After a week, the final therapy was completed by 61% of patients. The reasons for the delayed treatment included late

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admission to the hospital owing to resource or infrastructural limitations, septic open fractures, blistering, edema, and a lack of available theatre space. Bimalleolar fractures treated early and late did not significantly vary from one another. These results concurred with another study, who found no differences in treatment outcomes for patients who delayed care for up to 8 days [14]. Also, Konvath found that the results of treating bimalleolar fractures were the same whether they were treated early or late (mean 13.6 days from injury to surgery) [15]. Period of 11 days was the longest time since there wasn't enough theatre space. Early surgery may minimize a patient's hospital stay and save money, but swelling or blistering should delay treatment [16,17]. Sixty-one and two percent of the patients reported mild to severe discomfort. According to earlier research, pain increases between 23 to 60 percent after a year [18,19]. Due to the short follow-up period in this trial, the incidence of pain was greater. With time, it is anticipated to diminish [20]. Physiotherapy, surgical care, and a high medial clean space all decreased the functional capacity. Previous research indicates that operational therapy either yields superior results or yields results that are comparable to operative and non-operative treatment. The non-operative group had a higher functional capability, according to Makwana's research, even if the total results were the same for both groups [15,21]. The older subjects in the bulk of the research mentioned above experienced trauma due to low energy. The most of the participants in this research were young, and those who needed surgery were probably suffering from displacement and syndesmotic injuries caused by high intensity trauma. Operative management of the open fractures was linked to a lower score. One fourth of the patients received PT, yet even they had diminished functional ability. These are probably the people whose functional impairment was predicted as a result of their serious injuries, necessitating rehabilitation. The majority of the patients had only completed their basic or secondary school; these people are probably low-income and long-distance walkers. This might help to explain why, despite not receiving PT, the functional result was satisfactory.

CONCLUSIONS

Most of The Patients in This Study Was Young. Delaying Final Treatment For Up To A Week After The Fracture Does Not Seem To Have A Negative Impact On Outcomes, Despite The Fact That Physiotherapy Was Not Properly Monitored. The Medial Clean Space Was The Most Important Factor In Determining A Favorable Result; If It Was Less Than 4mm, The Outcome Was Favorable.

Conflicts of Interest

The authors declare no conflict of interest.

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