ORIGINAL ARTICLE

Outcome of Minimally Invasive Plate Osteosynthesis for Distal Femoral Fractures

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ABSTRACT

Background: Minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures using locking compression plate is used in our local setting but has not been extensively studied in Pakistani population.

Aim: To determine the outcome of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures using locking compression plate.

Methods: This descriptive case series study was carried out at Department of Orthopedics. One hundred and fifteen patients with fracture of the distal femur without any breach in skin (closed fracture) were operated using MIPO technique. Radiological union was determined within 12 weeks by X-ray. Radiological bone union was defined as bridging callus across the fracture site on both anteroposterior and lateral radiographs. Functional outcome of patient was assessed by using knee society scores and rated as excellent (91-100), good (74-89) and fair (60-74).

Results: One hundred fifteen patients were included in our study with mean age of 43.74±12.88 ranged from 25 to 75 years of age. Seventy six patients (66.1%) were male and remaining 39 patients (33.9%) were female. Among sampled population 106 patients (92.2%) achieved radiological union at 12 weeks. Knee society score of 14(12.2%) was fair, 69(60%) had good and 32(27.8%) with excellent score. Gender and age distribution were similar in both groups with & without radiological union.

Conclusion: Outcome of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures using locking compression plate is satisfactory in terms of union and functionality.

Keywords: Minimally invasive plate osteosynthesis (MIPO), Distal femoral fractures, Locking compression plate, Conservative management, Radiological union

INTRODUCTION

Fractures of the distal femur are common emergency presentation. These fractures are difficult to treat as they either affect younger patients after a high-energy trauma or elderly people[1,2,3,4]. Usual treatment in our hospitals is open reduction and internal fixation with locking compression plate for distal femoral fractures using locking compression plate. This open surgery technique requires extensive soft tissue dissection for exposure and traumatize larger area. Fractures of the distal femur profit from new, biological principles of treatment like minimally invasive plate osteosynthesis (MIPO), which help to diminish additional surgical trauma by indirect fracture reduction and insertion of stabilizing implants via mini-incisions[2,3,4,5,6].

The techniques which may be used for fractures of the distal femur are retrograde intramedullary nails and submuscularilly inserted plates/internal fixators[1,5] While intramedullary nails are well suited to fix extra medullary and simple articular fractures, plates can also be used to treat complex articular fractures. Technical advances as well as demographic changes will continue to represent challenges in the treatment of these fractures. In a study by Nayak et al[7] reported that 29 among 31 patients with fractures of the distal femur treated with minimally invasive plate osteosynthesis (MIPO) using locking compression plates had good or excellent outcomes (93.5%) using knee society score. In another study of 25 patients, functional outcome of knee was excellent in 10 patients (40%), satisfactory in 12 patients (48%) and fair in 2 patients (8%). One case was a failure. Magnitude of radiological bone union defined as bridging callus across the fracture site on both anteroposterior and lateral radiographs came out 96%[8].

PATIENTS AND METHODS

This descriptive case series study was carried out at Departments of Orthopedics of three different hospitals. One hundred and fifteen patients with fracture of the distal femur without any breach in skin (closed fracture) were operated using MIPO technique. All patients age between 25-75 years, only

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closed fractures of the distal femur and type AI, AII, AIII on AO classification were included. Patients having previous surgery or intervention for femoral fracture determined by history and advanced osteoporosis as diagnosed by X- ray were excluded. A uniform protocol of minimally invasive plate osteosynthesis (MIPO) using locking compression plate was adopted. Minimally invasive plate metallosynthesis is a method of osteosynthesis in which is manual comparison of the fragments and fixing them by the smallest possible incisions metal (usually titanium) plate with angular stability special screws, which, together with the plate, constitute a single system. These patients were followed for 12 weeks for outcome. Data collected was entered and analyzed in the SPSS version 17.

RESULTS

In our study population 115 patients were included with mean age of 43.74±12.88 ranged from 25 to 75 years of age. Seventy six patients (66.1%) were male and remaining 39 patients (33.9%) were female. One hundred and six patients (92.2%) had attained radiological union at the end of 12 weeks. Knee score of 14 patients (12.2%) was fair, 69(60%) had good and 32(27.8%) with excellent score. According to type of fracture, 48 patients (41.7%) were type A1, 49(42.6%) were AII and 18(15.7%) were type AIII (Table 1).

Table 1: Demographic information of the patients

Variable	No.	%
Age (years)		
<40	63	54.8
>40	52	45.2
Gender		
Male	76	66.1
Female	39	33.9
Radiological Union		
Yes	106	92.2
No	9	7.8
Functional Outcome		
Excellent	32	27.8
Good	69	60.0
Fair	14	12.2
Type of Fracture		
AI	48	41.7
AII	49	42.6
AIII	18	15.7

When age was compared with radiological union, results showed up non-significant (p=0.620) (Table 2). Among less than 40 years, 8 fair, 37 good and 18 were in excellent whereas among age more than 40 6 in fair , 32 in good and remaining 14 in excellent. Statistically the difference was non-significant [p=0.620] (Table 3). When compared gender with radiological union, the results showed significant (p=0.025) [Table 4]. When gender was compared with functional outcome by knee score, statistically the result was non-significant [p=0.252] (Table 5). The comparison with type of fracture with radiological union and results showed significant [p=0.025] (Table 6). When compared the fracture with functional outcome by knee score and results showed non-significant [p=0.191] (Table 7).

Table 2: Comparison of age with radiological union

Age (years)	Radiological Union		Total
	Yes	No	
<40	58	5	63
> 40	48	4	52
Using Fisher's Exact Test = 0.620 (Non-significant)			

Table 3: Comparison of age with functional outcome by knee score

Age (years)	Functional outcome by knee score			Total
	Fair	Good	Excellent	
<40	8	37	18	63
> 40	6	32	14	52
Using Fisher's Exact Test = 0.953 (Non-significant)				

Table 4: Comparison of gender with radiological union

Gender	Radiological Union		Total
	Yes	No	
Male	67	9	63
Female	39	-	52
Using Fisher's Exact Test = 0.025 (Significant)			

Table 5: Comparison of gender with functional outcome by knee score

Gender	Functional outcome by knee score			Total
	Fair	Good	Excellent	
Male	12	44	20	63
Female	2	25	12	52
Using Fisher's Exact Test = 0.252 (Non-significant)				

Table 6: Comparison of type of fracture with radiological union

Type of Fracture	Radiological Union		Total
	Yes	No	
AI	48	-	48
AII	43	6	49
AIII	15	3	18
Using Fisher's Exact Test = 0.025 (Significant)			

Table 7: Comparison of type of fracture with functional outcome by knee score

Gender	Functional outcome by knee score			Total
	Fair	Good	Excellent	
AI	2	30	16	48
AII	9	27	13	49
AIII	3	12	3	18
Using Fisher's Exact Test = 0.191 (Non-significant)				

DISCUSSION

Usual treatment in our hospitals is open reduction and internal fixation with locking compression plate for distal femoral fractures using locking compression plate. This open surgery technique requires extensive soft tissue dissection for exposure and traumatize larger area. Fractures of the distal femur profit from new, biological principles of treatment like minimally invasive plate osteosynthesis (MIPO), which help to diminish additional surgical trauma by indirect fracture reduction and insertion of stabilizing implants via mini-incisions[2,9-13].

In our study, among sampled population, 106 patients (92.2%) had attained radiological union at the end of 12 weeks. Union rate is appreciable as it is comparable with another study. Nayak et al[7] reported that magnitude of radiological bone union defined as bridging callus across the fracture site on both anteroposterior and lateral radiographs came out 96%.

In the present study, knee score of 14 patients (12.2%) was fair, 69(60%) had good and 32(27.8%) with excellent score. It is also comparable with previous study. In that study, 29 among 31 patients with fractures of the distal femur treated with MIPO using Locking Compression Plates had good or excellent outcomes (93.5%) using knee society score. In another study of 25 patients, functional outcome of knee was excellent in 10 patients (40%), satisfactory in 12 patients (48%) and fair in 2 patients (8%). One case was a failure.[8]

In the present study, 115 patients were included with mean age of 43.74±12.88 ranged from 25 to 75 years of age. 63 patients (54.8%) in our study population were below 40 years whereas 52 patients (45.2%) were either 40 years or more in age. When we cross tabulated age groups with radiological union and used fisher exact test results showed up non-significant (p=0.620). Among 106 radiological union patients 48 were in age group less than 40 years and rest of 48 were in group with 40 years or above age group.

When compared the age groups with function out come by knee score and used fisher exact test results showed up non-significant (p=0.620). Among less than 40 years, 8 fair, 37 good and 18 were in excellent whereas among age more than 40 6 in fair , 32 in good and remaining 14 in excellent. It implies that there is no effect of age on outcome of MIPO for distal femoral fractures using locking compression plate.

In our study sample, 76 patients (66.1%) were male and remaining 39 patients (33.9%) were female. It implies that in our sampled population almost 2/3rd were male while rest were female showing a more physical activity in male counterpart as compare to female counter part. This also determines the health seeking behavior in our community in which male are more prone to the fracture although this fracture is usually not due to sports activity only.

CONCLUSION

Radiological union is excellent as 92.2% achieved radiological union at 12 weeks while functional outcome using knee society score of 12.2% patients was fair, 60% had good and 27.8% with excellent score.

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