

Original Article

Assessment of outcomes of minimally invasive plate osteosynthesis for distal femoral fractures

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ABSTRACT:

Background: Distal femoral fractures are associated with high energy trauma in the youngsters and osteoporotic bones in the elderly. The present study was conducted to assess treatment outcomes of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures. **Materials & Methods:** 58 patients of distal femoral fractures of both genders were included. Parameters such as AO classification, causes of injury, knee score and functional score was recorded. **Results:** Out of 58 patients, males were 38 and females were 20. Etiology was RTA in 46, fall in 7 and physical violence in 5 cases. The difference was significant ($P < 0.05$). A1 was seen in 22, A2 in 8, A3 in 6, C1 in 10, C2 in 7 and C3 in 5 cases. The difference was significant ($P < 0.05$). The average time to union (months) was 3.2, average range of flexion was 114.6 degrees, knee score was 95.2 and functional score was 91.7. **Conclusion:** MIPO using LCP achieves favourable biological fixation for distal femoral fractures. Superior results were found in our study.

Key words: distal femoral fractures, knee score, functional score

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INTRODUCTION

Distal femoral fractures are associated with high energy trauma (in the youngsters) and osteoporotic bones in the elderly.¹ High energy injuries tend to occur in young males, whereas low energy injuries occur commonly in elderly females. These fractures often are unstable and comminuted. They are complex injuries that can be difficult to manage. Distal femoral fractures account for about 4% to 7% of all femoral fracture.² These fractures have got wide variety of fracture patterns and they are commonly associated with injuries such as open wounds, patellar fractures and ligament disruption. These serious injuries have the potential to produce significant long-term disability especially when they are associated with extensive articular cartilage damage, marked bone comminution, and severe soft tissue injury.³

Metaphyseal comminution is a challenge to conventional plate fixation.⁴ The locking compression plate (LCP) forms a fixed angle construct and enables placement of the plate without any contact to the

bone. It can therefore be used in metaphyseal comminution.⁵ The pull-out strength of locking screws is substantially higher than that of conventional screws, and it is difficult for one screw to pull out or fail unless all adjacent screws do so. The LCP acts as an internal fixator⁹ and can be used for minimally invasive plate osteosynthesis (MIPO).⁶ The present study was conducted to assess treatment outcomes of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures.

MATERIALS & METHODS

The present study comprised of 58 patients of distal femoral fractures of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. A thorough clinical examination was carried out. Parameters such as AO classification, causes of injury, knee score and functional score was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total-58		
Gender	Males	Females
Number	38	20

Table I shows that out of 58 patients, males were 38 and females were 20.

Table II Etiology of fractures

Etiology	Number	P value
RTA	46	0.01
Fall	7	
Physical violence	5	

Table II shows that etiology was RTA in 46, fall in 7 and physical violence in 5 cases. The difference was significant (P< 0.05).

Table III Assessment of AO classification

AO classification	Number	P value
A1	22	0.05
A2	8	
A3	6	
C1	10	
C2	7	
C3	5	

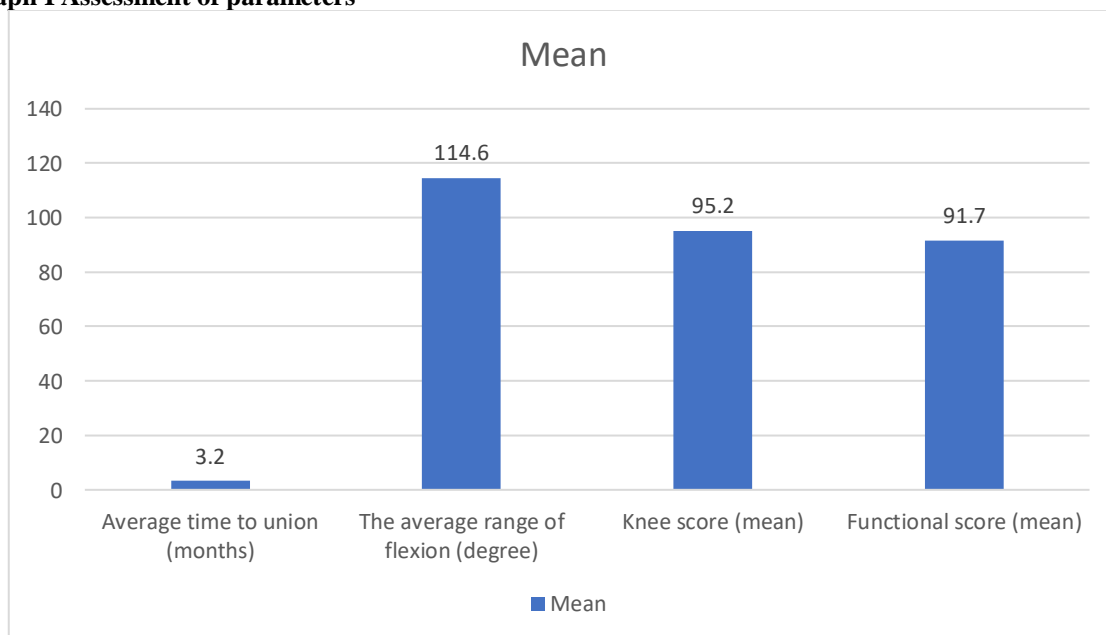
Table III shows that A1 was seen in 22, A2 in 8, A3 in 6, C1 in 10, C2 in 7 and C3 in 5 cases. The difference was significant (P< 0.05).

Table IV Assessment of parameters

Parameters	Mean	SD
Average time to union (months)	3.2	1.1
The average range of flexion (degree)	114.6	35.7
Knee score (mean)	95.2	6.2
Functional score (mean)	91.7	5.8

Table IV, graph I shows that average time to union (months) was 3.2, average range of flexion was 114.6degrees, knee score was 95.2 and functional score was 91.7.

Graph I Assessment of parameters



DISCUSSION

The problems which are commonly observed in these fractures are adequate exposure of articular surface, particularly of medial femoral condyle and coronal plane fractures are challenging.⁷ Standard implants used for other types of distal femoral fractures like condylar blade plate and supracondylar nails are not helpful in particular surface reduction and fixation.⁸ In setting of medial comminution and short distal

segment, there is high incidence of loss of fixation and varus collapse. It is now recognized by most orthopaedic surgeons that distal femoral fractures are best treated with reduction and surgical stabilization.^{9,10}The present study was conducted to assess treatment outcomes of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures. We found that out of 58 patients, males were 38 and females were 20. Nayak et al¹¹evaluated treatment

outcomes of minimally invasive plate osteosynthesis (MIPO) for distal femoral fractures in 31 patients. 22 male and 9 female consecutive patients aged 21 to 65 (mean, 42) years underwent minimally invasive plate osteosynthesis using a locking compression plate (LCP) for distal femoral fractures. The causes of injury were vehicular accidents (n=24), falls (n=6), and assault (n=1). According to the AO classification, the fractures were classified as types A1 (n=10), A2 (n=7), and A3 (n=14). Most fractures were closed; 3 were Gustilo type-II fractures. Clinical and functional outcomes were assessed using the Knee Society Scores. The mean operating time was 70 (range, 60–100) minutes. The mean length of hospital stay was 9 (6–14) days. The mean time to union was 3.7 (range, 2.8–4.6) months. The mean follow-up period was 18 (14–26) months. At the one-year follow-up, 29 of the patients had good or excellent outcomes.

We found that etiology was RTA in 46, fall in 7 and physical violence in 5 cases. We found that A1 was seen in 22, A2 in 8, A3 in 6, C1 in 10, C2 in 7 and C3 in 5 cases. Miclau et al¹² bone graft rates of supracondylar femur fractures ranged between 0% and 87%. Relatively low rate of bone grafting in our series is probably due to improved surgical technique with better soft tissue handling.

We found that average time to union (months) was 3.2, average range of flexion was 114.6degrees, knee score was 95.2 and functional score was 91.7. Locking plate systems such as the Less Invasive Stabilization System (LISS) have been extensively used for distal femoral fractures. LISS has a lower risk of early implant loosening than the dynamic condylar screw and promotes early mobilisation and rapid healing without bone grafting, with low rates of infection and less blood loss. The LCP differs from the LISS in that the LCP has combination holes and does not have a jig. Pain over the lateral aspect of the distal femur following fixation with the LISS has been attributed to the jig.¹³

Minimally invasive surgical techniques with a submuscular plate placement have replaced the emphasis on anatomical reduction in the shaft area. Reconstruction of complex articular injuries has been simplified by more direct visualization of the articular surface with the lateral peripatellar approach. Problems remaining are surgical technique and implant considerations. The Less Invasive Stabilization System (LISS) simplifies the surgical technique for percutaneous plate osteosynthesis. An insertion guide is used to insert monocortical, self-tapping screws through a stab incision. A thread in the plate provides the angular stability for the anchoring of these screws. In extra-articular fractures and simple intra-articular fractures, the distal femoral nail permits intramedullary stabilization. A spiral blade improves fixation of the distal femoral condylar block.¹⁴ Despite the enhanced surgical technique and implant possibilities, a great number of patients show a functional deficiency. These are particularly patients

with complex intra-articular fractures. The 'fatigue failure' of the osteoporotic implant-bone construct is a problem in elderly patients. The LISS represents a good option to avoid the addition of bone cement to an osteosynthesis.¹⁵

The limitation the study is small sample size.

CONCLUSION

Authors found that MIPO using LCP achieves favourable biological fixation for distal femoral fractures. Superior results were found in our study.

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