

Original Research Article

Is locking compression plate the best modality of treatment for distal femur fractures?

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ABSTRACT

Background: This observational study was conducted in order to study the functional efficacy of locking compression plate in distal femur fractures as they are one of the most common type of fractures with bimodal age distribution affecting younger age group as a consequence of high energy trauma especially road traffic accidents and elderly population due to osteoporosis.

Methods: 40 Patients who are skeletally matured with acute distal femur fractures were radiologically assessed type of fractures, amount of comminution, articular congruence and quality of bone. pretested proforma which include age, sex, occupation, mode of injury, type of fracture, time interval between injury and surgery, associated comorbid conditions and other associated injuries.

Results: Off the 40 patients under study 21 showed excellent outcome according to neers rating system and only 5 had fair results, 3 patients had superficial wound infection and 5 developed knee stiffness.

Conclusions: Locking compression plate produces better results and appears to be good method of management in distal femur fractures.

Keywords: Distal femur fractures, Locking compression plates, Osteoporosis

INTRODUCTION

Fracture of distal femur involves distal femoral metaphysis and the femoral condyles. They represent 6% of all femoral fractures. If hip fractures are excluded, 31% of femoral fractures involve distal portion. With the increased incidence of high energy trauma, especially road traffic accidents, difficulty in treating these fractures are also increased.¹

Adding to this, occurrence of these fracture in older age group with osteoporotic bones, has also increased the difficulty in treating them.

Because of the proximity of these fractures to knee joint, regaining full knee motion and function may be difficult. Soft tissue damage, comminution, fracture extension into the knee joint and associated injury to Quadriceps mechanism leads to unsatisfactory results regardless of the treatment modality.

First between 20-30 years of age, mostly males to sustain a distal femoral fracture as a result of high velocity trauma due to road traffic accident. In these cases fractures occurs as a consequence of direct application of force to flexed knee joint. A familiar patho- mechanism is the "Dashboard injury" whereby an impact on flexed knee forces patella back in between the femoral condyles like wedge to produce injury.

A recent advance in technology for the treatment of distal femoral fracture include the less invasive skeletal stabilization system (LISS) and locking compression plate (LCP).²⁻⁷

They offer multiple points of fixed angle contact between the plate and screws in distal femur (Angle stable construct) reducing the tendency of varus collapse and at the same time afford better stability.

METHODS

Prospective study conducted in the Department of Orthopaedics, Sri Ramachandra Medical College and Research Institute, Porur, Chennai. During time period Of January 2017- July 2018, wherein 40 patients who was skeletally matured with distal femur fractures were part of the study.

Inclusion criteria

Inclusion criteria were presence of distal 3rd femoral fractures which needs to be internally fixed in displaced Muller's Type A and Type C fractures; age more than 16 years; patient who is preoperatively mobile.

Exclusion criteria

Exclusion criteria were Muller's Type B fractures; skeletal immaturity with open physis; undisplaced fracture patterns needing only conservative management; patients not willing for surgery; pathological fractures.

Table 1: The fractures were classified according to muller's subtypes.

Muller's subtypes	Total number of cases
A1	6
A2	4
A3	11
C1	5
C2	8
C3	6

A thorough clinical examination was done as per predesigned and pretested proforma which include age, sex, occupation, mode of injury, type of fracture, time interval between injury and surgery, associated comorbid conditions and other associated injuries. Routine investigations like haemogram, blood sugar, urea, creatinine, serum electrolytes, x-ray chest, ECG, BT and CT was done. Medical and anesthetic fitness was obtained for all the patients before surgery. X-ray femur AP/ Lateral view from the knee to proximal femur was taken for all the 40 cases and following features were assessed: type of fracture, amount of comminution, Articular congruence and quality of bone. All other

requisite x-rays to rule out associated injuries were also taken.

After proper preoperative planning and on having obtained taken up for surgery where both anterior and anterolateral approaches were done. LCP and cancellous screws of appropriate length were used to fix the fractures after adequate intraoperative reduction.

Post operative care and rehabilitation were initiated and divided into early phase and late phase.



Figure 1: (A) Case illustration; (B) immediate post-op pre-op; (C) 10 weeks post op; (D) clinical picture.

RESULTS

These cases were analysed as per the following criteria:

- Age distribution
- Sex distribution
- Mode of injury
- Side of injury
- Open/Closed fracture
- Subtype of fracture
- Associated injury
- Union time

Table 2: Age distribution.

Age (years)	Frequency	Percentage (%)
20-29	5	12.5
30-39	9	22.5
40-49	8	20.0
50-59	8	20.0
60-69	10	25.0
Total	40	100.0

Table 3: Sex distribution.

	Frequency	Percentage (%)
Female	23	57.5
Male	17	42.5
Total	40	100.0

Table 4: Mode of injury.

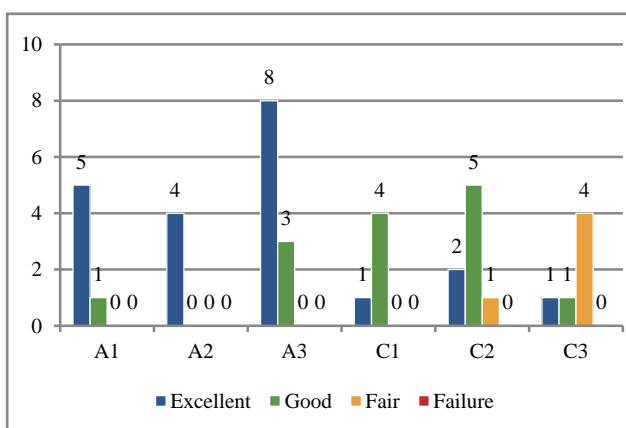
	Frequency	Percentage (%)
Accidental fall	18	45.0
RTA	22	55.0
Total	40	100.0

Table 5: Side of injury.

	Frequency	Percentage (%)
Left	17	42.5
Right	23	57.5
Total	40	100.0

Table 6: Open/ closed fracture.

		Frequency	Percentage (%)
Valid	Closed fracture	35	87.5
	Open fracture	5	12.5
	Total	40	100.0

**Figure 2: Muller's subtypes.**

Maximum incidence of distal femur fractures was in age group 60 to 69 years (25%). Females had higher

incidence when compared to males (57.5%). Road traffic accidents (55%) had higher incidence when compared to accidental fall (45%) in our study. Right side (57.5%) fracture was more common in our study than left side, closed distal femur fractures (87.5%) was more common.

The average range of knee motion achieved was about 97°. The mean union time of all fractures is 12.5 weeks, outcome was good to excellent in 35 out of 40 cases (87.5%).

DISCUSSION

The aim of the study is to discuss the results of fractures of distal femur managed by LCP and to analyze the results. We evaluated 40 cases of displaced distal femur fractures treated with locking compression plate. Based on the functional outcome at 6 months using NEER's scoring system, we obtained 52.5% Excellent, 35% Good and 12.5% fair outcome with this system. The results as per Neer's rating system was good to excellent in 35 out of 40 cases and were fair to poor in remaining cases. Our results varied according to the fracture subtype. All cases united within expected time except for three cases which was C3 Muller's subtype ended in delayed union. The mean range of knee motion was 30°-130°. The results were comparable to the study by Kregor, Standard, Zlovodzki.⁸

In our study, radiological union was seen at an average of 12.5 weeks which is comparable to study of LISS plates by Markmiller, et al, CORR, that averages 13.8 weeks.⁹ The outcome seems to correlate with certain functions. In cases of severe intra-articular comminution, the outcome depends on the quality of reduction intra-operatively. Good reduction with <2 mm articular incongruence is required for good outcome.

There were five compound injuries in our study in which three patients had good outcome and two were fair. In which three patients had superficial wound infection, one had knee stiffness probably due to soft tissue injury at the time of initial injury. Hence, compound fractures should be treated aggressively but with guarded prognosis.

CONCLUSION

This study comprises of 40 patients with displaced Distal femur fracture treated by Locking Compression Plate. Locking compression plate appears to be technically an ideal implant for comminuted osteoporotic bone providing an angle stable construct and with proper physiotherapy. It produced results with 100% union and here by eliminating age old problems of varus collapse, mal-union and nonunion. Hence we conclude that using Locking compression plate produces better results and appears to be a good method of choice for management of distal femur fracture.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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