



Clinical and functional outcome of lateral Locking Compression Plate fixation in supracondylar fracture of femur

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Abstract

Background: Supracondylar fractures of the femur, typically occurring near the knee joint, represent a complex and challenging injury, often resulting from high-energy trauma such as motor vehicle accidents or falls from height. These fractures account for a significant portion of distal femur fractures and can severely impact the knee's mechanical axis, leading to functional impairment and prolonged disability if not managed appropriately. The lateral locking compression plate (LCP) has emerged as a preferred method for internal fixation due to its ability to provide angular stability, minimize soft tissue disruption, and promote early mobilization. This study aimed to assess the clinical and functional outcomes of lateral locking compression plate fixation in supracondylar fractures of the femur.

Material and Method: A prospective observational study was conducted in the department of Orthopaedics, S. S. Institute of Medical Sciences & Research Centre, Davanagere. enrolling 48 patients with supracondylar femur fractures. Patients with compound fractures and those unwilling to participate were excluded. Following institutional ethics approval and patient consent, demographic and clinical data were collected. Patients underwent surgery using lateral LCP and were followed up postoperatively to assess clinical outcomes, complications, range of movement, and Knee Society Score (KSS). Data were analysed using SPSS v23.0.

Results: The study included 48 patients (mean age: 46.2 years; 12 females, 36 males). The predominant injury mechanism was road traffic accidents (75%). Diabetes was present in 16.7%, and hypertension in 12.5% of patients. Complete healing without complications was observed in 70.8% of cases, while 16.7% experienced malalignment, 8.3% had non-union, and 4.2% developed infections. Range of motion between 90-120 degrees was achieved in 66.7% of patients. Functional outcomes were rated as good in 45.8%, excellent in 25%, fair in 25%, and poor in 4.2%.

Conclusion: The lateral locking compression plate is an effective treatment for supracondylar fractures of the femur, offering significant improvements in clinical and functional outcomes. It facilitates better range of movement and satisfactory healing in most patients.

Keywords: Supracondylar femur fracture, lateral locking compression plate, distal femur fracture, internal fixation, clinical outcomes, functional recovery and Knee Society Score (KSS)

Introduction

Supracondylar fractures of the femur, typically occurring near the knee joint, represent a complex and challenging type of injury, often associated with high-energy trauma such as motor vehicle accidents or falls from height^[1, 2]. These fractures account for a significant portion of distal femur fractures and can severely impact the knee's mechanical axis, leading to functional impairment and prolonged disability if not managed appropriately^[3].

The treatment of these fractures has evolved with advancements in surgical techniques and implant designs. Among these, the lateral locking compression plate (LCP) has emerged as a preferred method for the internal fixation of supracondylar femoral fractures. The LCP provides angular stability and allows for early mobilization by minimizing soft tissue disruption and enhancing fracture stabilization.^[4, 5]

Clinical outcomes of lateral LCP fixation have been promising, demonstrating advantages such as reduced malunion rates, better alignment, and improved weight-bearing capabilities. Functionally, patients treated with LCP tend to show enhanced recovery of knee function and a higher rate of return to pre-injury activity levels. This introduction explores the clinical and functional outcomes

associated with the use of lateral LCP in the surgical management of supracondylar femur fractures, highlighting its efficacy in promoting bone healing and restoring limb function.

Present study aimed to assess the Clinical and functional outcome of lateral locking compression plate fixation in supracondylar fracture of femur.

Material & Method

This prospective observational study was conducted among the patients presenting with distal end femur fracture of supracondylar type at department of Orthopaedics, S. S. Institute of Medical Sciences & Research Centre, Davanagere. Patients with compound fractures and not willing to be part of study were excluded from the study. The patients were enrolled after obtaining the institutional ethics clearance and the patients consent was obtained prior to enrol. A total of 48 cases were included in the study who underwent the surgery for distal femur fracture. Patients demographic details were collected and underwent general physical examination, systemic examination. The patients were followed up post operative to re-assess the clinical outcome, complications, range of movement and KSS score among the patients. All the patients data were collected in proforma.

Surgical Technique

The lateral approach to the distal femur allows visualization, reduction, and fixation of simple articular fractures, while more complex fractures may need a lateral or medial parapatellar approach. This method relies on atraumatic elevating the vastus lateralis and may include or omit a lateral arthrotomy, depending on the need for joint visualization. The approach can be extended proximally if required. Prophylactic antibiotics were administered according to local antibiotic policy and specific patient requirement. For the skin incision, start mid-laterally at Gerdy's tubercle and curve it proximally over the lateral femoral condyle. Its extent depends on the fracture and need for arthrotomy. Division of the iliotibial band follows the skin incision, matching muscle fiber orientation to facilitate precise closure. Elevation of the vastus lateralis involves incising its fascia and elevating the muscle fibers, while retracting anteromedially and ligating perforating vessels to control bleeding. Care was taken to preserve periosteum for later fracture healing. Joint capsule arthrotomy, if needed,

involves incising the joint capsule for articular surface visualization, avoiding excessive tension on the patellar tendon, especially in osteoporotic patients. Wound closure includes suturing the joint capsule (if arthrotomy was performed), the fascia of the vastus lateralis, and the iliotibial band with absorbable sutures, and closing the skin and subcutaneous tissues routinely.

Statistical analysis: All the data were entered in excel sheet and analysed using SPSS v23.0 operating on windows 10. The patients, data were summarised as mean, standard deviation, frequency and percentage. For all statistical purpose a p-value of <0.05 was considered statistically significant.

Result

Total 48 patients fulfilling inclusion criteria are included with mean age of 46.2yrs. Among them 12 were female and 36 were male patients (male preponderance). Among the patients diabetes was present in 16.7% and hypertension in 12.5%. Most common mode of injury was RTA (75%)

Table 1: Demographic details of the patients

		Frequency	Percent
Age	<40yr	26	54.2
	>40yrs	22	45.8
Gender	Male	36	75.0
	Female	12	25.0
Comorbidities	Nil	34	70.8
	Diabetes	8	16.7
	Hypertension	6	12.5
Mode of injury	Fall	12	25.0
	RTA	36	75.0
Affected side	Right	32	66.7
	Left	16	33.3
Time interval between injury and surgery	<3d	22	45.8
	3-6d	20	41.7
	>6d	6	12.5
Type of injury	33C1	10	20.8
	33C2	18	37.5
	33C3	20	41.7

The most common affected side was right, and presented to hospital within 6 days of injury.

Table 2: Showing the outcome in patients

		Frequency	Percent
Bone grafting	Nil	36	75.0
	Primary bone grafting	6	12.5
	Secondary bone grafting	6	12.5
Complications	Infection	2	4.2
	Non-union	4	8.3
	Mal-alignment	8	16.7
	Nil	34	70.8
Range of movements	80-90 degree	6	12.5
	90-120 degree	32	66.7
	More than 120 degree	10	20.8
KSS	Excellent	12	25.0
	Good	22	45.8
	Fair	12	25.0
	Poor	2	4.2

Complete healing with no complication was seen in 70.8% of the patients, 16.7% presented with mal-alignment, 8.3% with non-union and 4.2% with infection. The range of motion was seen to be 90-120 degrees in 66.7% of the

patients. The functional outcome and satisfactory was found to be 45.8% with good, 25% with excellent, fair and 4.2% with poor.



Fig 1: Patients radiographic images pre and post treatment.



Fig 2: Patients radiographic images pre and post treatment

Discussion

The treatment of supracondylar femur fractures, particularly those near the knee, continues to pose significant challenges in orthopaedic surgery due to the fractures' intricate nature and their potential to severely impact function. With recent advancements in surgical methods and fixation devices, there has been a notable shift towards the use of lateral locking compression plates (LCPs) for internal fixation. These plates offer angular stability, which enhances fixation in cases of osteoporotic bone and promotes early mobilization.

Total 48 patients fulfilling inclusion criteria are included with mean age of 46.2yrs. Among them 12 were female and 36 were male patients (male preponderance). Among the patients diabetes was present in 16.7% and hypertension in 12.5%. Most common mode of injury was RTA (75%). Most patients had surgery within three days. According to Kiran Kumar, et al. road traffic accidents accounted for more than half of the cases.⁶ Similarly, research by Kiran Patil, et al. observed that distal femur fractures were predominantly caused by high-speed road traffic accidents and that intra-articular distal femur fractures were more frequent on the right side compared to the left.⁷

Gwathmey et al. proposed several techniques to prevent collapse and malunion in distal femur fractures. These include bicortical proximal screw fixation, medial augmentation using primary bone grafting or plating for substantial metaphyseal defects, protected weight bearing, and prompt surgical intervention with bone grafting for delayed union.⁸ Complications identified in the study were infection (4.1%), malalignment (16.6%), and non-union (8.3%), indicating that nearly 30% of the subjects experienced complications—a significant proportion. According to literature lateral locking plates are effective in managing distal femoral fractures, achieving good union rates between 81% and 95%. However, complications related to the use of a single plate, such as loss of reduction, malunion, rotational mal-positioning, and breakage, have been reported, leading to revision surgeries in 19% to 23% of cases. Despite these issues, most patients achieved a range of motion between 90 and 120 degrees. Similar to present study a good functional outcome on KSS score was found in Kerakkanavar, et al. with majority in good and fair results.^[9] Present study found that the lateral locking compression plate in supracondylar fracture of femur is effective with better functional and clinical outcome among the patients. There is significant improvement in the range of movement and the satisfactory outcome is seen in majority of the cases.

Conclusion

The study concludes that the lateral locking compression plate is a highly effective modality for treating supracondylar femur fractures. It facilitates better functional and clinical outcomes, with significant improvements in range of movement and patient satisfaction observed in the majority of cases. The lateral LCP's capacity to provide angular stability, support early weight-bearing, and minimize complications makes it a valuable tool in the orthopaedics management of distal femoral fractures. Further studies with larger sample sizes and longer follow-up periods are recommended to confirm these findings and refine surgical techniques.

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Reference

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