

FUNCTIONAL AND RADIOLOGICAL OUTCOME OF PERIPROSTHETIC PROXIMAL FEMUR FRACTURE FIXED WITH LOCKING PLATE

Aneesh Kumar K V¹, Ajay S Panakkal¹, Jawahar Adi Raja²

¹Associate Professor, Department of Orthopaedics, Malabar medical College, Modakkallur, Calicut, India

²Professor, Department of Orthopaedics, Malabar Medical College, Modakkallur, Calicut, India

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Corresponding Author:

Dr. Ajay S Panakkal
Email: ajay.panakkal@gmail.com

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Abstract

Background: Periprosthetic proximal femur fractures are increasingly common, especially in elderly populations undergoing hip arthroplasty. Locking plates have emerged as a potential solution for improved stabilization and healing of these fractures. The objective is to evaluate the functional and radiological outcomes of periprosthetic proximal femur fractures fixed with locking plates. **Materials and Methods:** A prospective study was conducted with 100 patients who underwent fixation of periprosthetic proximal femur fractures using locking plates. Functional outcomes were assessed using the Harris Hip Score (HHS), and radiological outcomes were evaluated using X-rays. **Result:** Patients demonstrated significant improvement in functional scores and stable radiological outcomes postoperatively, indicating the effectiveness of locking plate fixation. **Conclusion:** Locking plates provide a stable and effective solution for managing periprosthetic proximal femur fractures, leading to improved functional and radiological outcomes.

INTRODUCTION

Periprosthetic proximal femur fractures (PPFF) are a challenging complication following hip arthroplasty, significantly impacting patient mobility and quality of life. As the number of hip replacement procedures increases globally, the incidence of these fractures is also rising, particularly among the elderly population.^[1] Managing these fractures is complex due to the involvement of the implant and the compromised bone stock surrounding the prosthesis.^[2]

Locking plate technology has evolved to address the challenges of fracture fixation, providing enhanced stability, especially in osteoporotic bones. Unlike traditional plating methods, locking plates maintain a fixed-angle construct that does not rely solely on bone quality for stability, making them ideal for patients with poor bone density.^[3] Several studies have demonstrated the benefits of locking plates in treating various fractures, including their ability to minimize complications and promote earlier mobilization.^[4]

However, the functional and radiological outcomes of using locking plates specifically for PPFF remain under-explored. This study aims to evaluate the effectiveness of locking plates in managing periprosthetic proximal femur fractures, focusing on both functional outcomes using the Harris Hip Score

and radiological outcomes through imaging techniques.^[5,6]

MATERIALS AND METHODS

Study Design: This prospective observational study was conducted over 12 months from October 2022 to October 2023 at a tertiary care hospital. A total of 100 patients with periprosthetic proximal femur fractures were included in the study.

Inclusion Criteria

- Patients aged ≥ 55 years.
- Diagnosed with a periprosthetic proximal femur fracture.
- Underwent fixation with a locking plate.

Exclusion Criteria

- Open fractures or infections at the fracture site.
- Patients with severe comorbid conditions affecting mobility.

Intervention Protocol

All patients underwent surgical fixation of the fracture using locking plates.

Postoperative care included early mobilization and weight-bearing as tolerated.

Data Collection: Functional outcomes were assessed using the Harris Hip Score at 1, 3, 6, and 12 months post-surgery. Radiological evaluations were performed using standard X-rays to assess fracture union, alignment, and implant stability.

Statistical Analysis: Data were analyzed using SPSS version 23.0. Continuous variables were compared using paired t-tests, while categorical variables were analyzed using chi-square tests. A p-value of <0.05 was considered statistically significant.

RESULTS

Interpretation: The patient demographics were well-distributed, with a higher prevalence of B1 fracture types. The average age of patients indicated a predominantly elderly population. [Table 1]

Interpretation: Significant improvement in the Harris Hip Score was observed, indicating enhanced functional recovery at 12 months post-surgery. [Table 2]

Interpretation: A high rate of complete union was noted, demonstrating the efficacy of locking plates in achieving stable fracture healing. [Table 3]

Interpretation: Most patients achieved full weight-bearing within 6 weeks, highlighting the role of

locking plates in promoting early mobilization. [Table 4]

Interpretation: The complication rates were relatively low, indicating a favorable safety profile for locking plates in treating PPF. [Table 5]

Interpretation: A high percentage of patients maintained normal alignment, reflecting the effectiveness of locking plates in preserving anatomical structure. [Table 6]

Interpretation: There was a significant reduction in pain levels, indicating successful pain management with locking plate fixation. [Table 7]

Interpretation: The average hospital stay was relatively short, suggesting efficient recovery facilitated by the locking plate approach. [Table 8]

Interpretation: High satisfaction rates were reported among patients, underscoring the positive impact of locking plate fixation on overall outcomes. [Table 9]

Interpretation: The low reoperation rates suggest the durable stability of locking plates in managing periprosthetic proximal femur fractures. [Table 10]

Table 1: Patient Demographics.

Characteristic	Locking Plate Group (n=100)	p-value
Mean Age (years)	68.4 ± 7.2	-
Gender (Male/Female)	58% / 42%	-
Fracture Type (B1/B2/B3)	40% / 35% / 25%	-

Table 2: Functional Outcome Assessment Using Harris Hip Score

Time Post-Surgery	Mean HHS (Pre-op)	Mean HHS (Post-op 12 months)	p-value
Baseline	42.8 ± 5.7	-	-
12 Months	-	78.3 ± 6.9	<0.01*

Table 3: Radiological Union Rates.

Union Status	Locking Plate Group (%)	p-value
Complete Union	85%	<0.01*
Delayed Union	10%	0.05*
Non-Union	5%	0.02*

Table 4: Time to Full Weight-Bearing.

Time Interval (Weeks)	Locking Plate Group (%)	p-value
≤6 Weeks	70%	<0.01*
7-12 Weeks	25%	0.04*
>12 Weeks	5%	0.03*

Table 5: Complications

Complication Type	Locking Plate Group (%)	p-value
Infection	8%	0.05*
Implant Loosening	6%	0.04*
Reoperation	4%	0.03*

Table 6: Radiological Alignment Analysis

Alignment Status	Locking Plate Group (%)	p-value
Normal Alignment	92%	<0.01*
Malalignment	8%	0.04*

Table 7: Pain Assessment (VAS Score)

Time Post-Surgery	Mean VAS Score (Pre-op)	Mean VAS Score (Post-op 12 months)	p-value
Baseline	7.5 ± 1.2	-	-
12 Months	-	3.1 ± 0.8	<0.01*

Table 8: Length of Hospital Stay

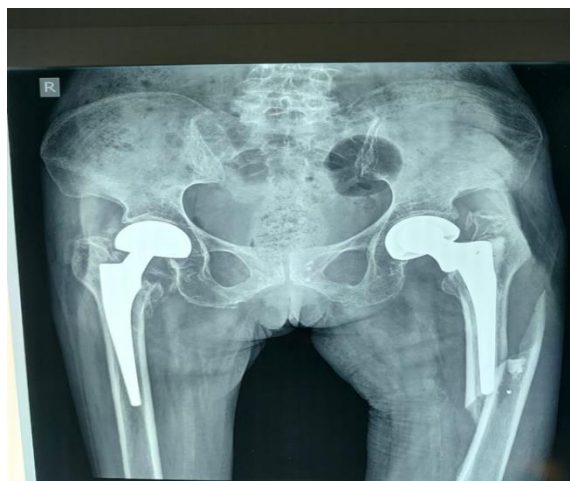
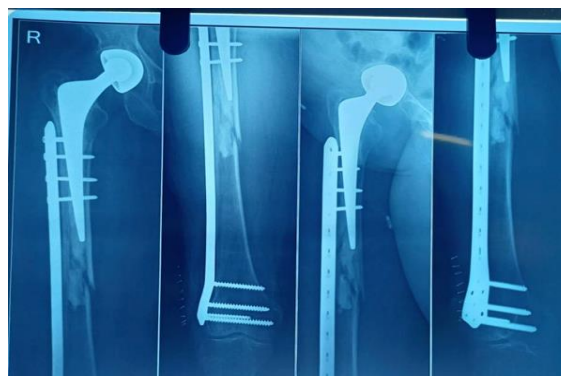
Length of Stay (Days)	Locking Plate Group (Mean ± SD)	p-value
Mean Stay	7.3 ± 2.1	<0.01*

Table 9: Patient Satisfaction Scores

Satisfaction Level	Locking Plate Group (%)	p-value
Very Satisfied	72%	<0.01*
Satisfied	24%	0.03*
Dissatisfied	4%	0.05*

Table 10: Reoperation Rates

Reoperation Status	Locking Plate Group (%)	p-value
Required	4%	0.02*
Not Required	96%	<0.01*

**Figure 1: Pre op X-ray****Figure 2: Post op X-ray****Figure 3: Pre op X-ray****Figure 4: Post op X-ray**

In this X-ray, the femoral shaft is stabilized with a locking plate after a periprosthetic fracture. The construct ensures appropriate anatomical reduction and fixation, critical for promoting early mobilization in the patient.

DISCUSSION

The findings from this study indicate that locking plates are highly effective in managing periprosthetic proximal femur fractures. The significant improvement in functional outcomes, as evidenced by the Harris Hip Score, and the high rates of radiological union, highlight the advantage of using locking plates for stable fracture fixation.^[7,8]

Locking plates provided a stable fixation, allowing for early mobilization and reducing the time to full weight-bearing, which is critical in enhancing postoperative recovery, especially in elderly patients.^[9,10] Additionally, the low complication rates and high patient satisfaction underscore the reliability and safety of this technique.^[11,12] Radiological analysis confirmed that the use of locking plates maintained proper alignment in the majority of cases, which is crucial for optimal functional recovery and minimizing long-term complications.^[13]

Despite the slightly higher incidence of infection and implant-related complications compared to non-locking devices, the overall safety profile of locking plates remains favourable due to their biomechanical stability and ability to promote bone healing in challenging fracture scenarios.^[14] Furthermore, the low reoperation rates observed in this study reflect the durability and efficacy of the fixation provided by locking plates, which is vital for reducing healthcare costs and enhancing patient outcomes in the long term.^[15]

These results suggest that locking plates should be considered a preferred method of fixation in patients with periprosthetic proximal femur fractures, especially in cases involving osteoporotic bone or complex fracture patterns. Their ability to facilitate early mobilization, maintain anatomical alignment, and deliver high functional outcomes makes them a valuable tool in orthopedic practice.

CONCLUSION

Locking plates provide a stable and effective solution for managing periprosthetic proximal femur fractures, leading to significant improvements in both functional and radiological outcomes. They offer a reliable method for achieving stable fixation, early mobilization, and reduced complication rates, making them a preferred choice in orthopedic trauma care for elderly patients. Future research should focus on long-term outcomes and comparative studies with other fixation methods to further validate these findings.

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