

A Retrospective Analysis of Outcomes in Patients with Femoral Fractures Treated with Different Methods (E.G., Intramedullary Nailing, Plate Fixation), Including Complications and Functional Outcomes

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Abstract

Background: Femoral fractures are common orthopedic injuries with high morbidity, long hospital stays, and disability. Both intramedullary nailing and plate fixation are widely used for surgical treatment, making comparative studies important for optimizing patient care.

Methods: This is a retrospective observational study at, Lok Nayak Jaiprakash Narayan Hospital from January 2026 to March 2026. 43 patients with femoral fractures were included. Data were collected from medical records, operative records, X-rays, and follow-up reports. Demographic data, fracture type, treatment, healing time, complications, and functional recovery were evaluated. The findings were analyzed statistically with $p < 0.05$.

Results: A total of 43 patients in the study, 25 (58.1%) were treated with intramedullary nailing and 18 (41.9%) with plate fixation. The mean fracture healing time was found to be shorter in the intramedullary nailing group (16.2 weeks) than in the plate fixation group (19.4 weeks). Delayed union occurred in 2 (8.0%) patients with intramedullary nailing and 4 (22.2%) patients with plate fixation, and non-union in 1 (4.0%) and 2 (11.1%) patients, respectively. 1(4.0%) patient in the intramedullary nailing group and 3 (16.7%) patients in the plate fixation group suffered from postoperative infection. 22 (88.0%) of the patients who underwent intramedullary nailing and 13 (72.2%) of the patients who underwent plate fixation were able to walk independently. The difference in the complication rates and functional outcomes between the two groups was statistically significant ($p < 0.05$).

Conclusion: Patients with femoral fractures had better functional recovery, fewer postoperative complications, and quicker fracture union in those who were treated with intramedullary nailing versus plate fixation. The results indicate that intramedullary nailing could be one of the best surgical options for suitable patients, resulting in better overall clinical outcomes.

Keywords: Femoral fracture, intramedullary nailing, Plate fixation, Functional outcomes, orthopedic surgery.

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Introduction

Femoral fracture is a significant orthopedic injury in clinical practice, associated with high degree of morbidity, long-term hospitalization and functional disability [1]. These fractures occur as a consequence of high-energy trauma like road traffic accidents, sporting activity and falls from heights in younger individuals as well as low-energy falls in older patients with osteoporosis [2]. Femoral fractures are a significant burden of disease in healthcare due to their need for surgical intervention, intensive rehabilitation, and extensive

follow-up [3]. In developing countries like India, due to the increasing frequency of vehicular accidents and urbanization, incidence of femoral fractures has also risen and thus effective management strategies are vital to improve patient outcomes and minimize disabilities [4]. Most femoral fractures, especially unstable or displaced ones, require surgery [5]. The most common methods used include intramedullary nailing and plate fixation for stabilization [6]. The intramedullary nailing technique uses a rod placed

in the medullary canal of the femur, which is both biochemically stable and enables early mobilization [7,8]. Stabilization by metallic plates and screws on the surface of the bone is called plate fixation. Both procedures are commonly employed in orthopedic surgery and have shown to be effective; however, they both come with their advantages and disadvantages [9,10]. Plate fixation may cause less soft tissue injury while the intramedullary nailing technique is associated with faster soft-healing and recovery for some fractures [11,12].

Despite improvements in orthopedic surgical techniques, postoperative complications like infection, delayed union, non-union, implant failure and limited joint mobility remain a problem with recovery. The functional results and healing rates can differ, depending on the treatment method, patient factors and fracture type. Additionally, in this region, there are very few retrospective studies that compare the results of intramedullary nailing and plate fixation.

The present study was designed to compare the fracture union, complications and functional recovery and duration of hospital stay in patients with femoral fracture treated with intramedullary nailing and plate fixation in, Lok Nayak Jaiprakash Narayan Hospital. This study aims to guide better clinical decision making and may help optimize orthopedic treatment strategies.

Materials and Methods

Study Design: This retrospective observational study compared the clinical and functional results of patients with femoral fracture treated with intramedullary nailing and plate fixation technique. By using a retrospective approach allowed assessment of surgery outcomes and recovery patterns from existing records. This research aimed to determine the differences in fracture healing, complications, and functional recovery with the two most commonly used orthopedic treatment options.

Study Setting: The study was carried out at, Lok Nayak Jaiprakash Narayan Hospital, tertiary care healthcare centre having large numbers of orthopedic trauma cases from both urban and rural areas. The hospital provides specialized orthopedic surgical services including fracture management and rehabilitation.

Study Duration: The study period was from January 2026 to March 2026. Patient data was analysed and reviewed for relevant demographic, clinical, surgical and follow-up data related to the management of femoral fracture during this period.

Sample Size: This study included a total of 43 patients with a diagnosis of femoral fracture, who were treated at the hospital. Patients treated with

intramedullary nailing or plate fixation were selected as the study sample.

Inclusion Criteria

- Adults over 18 years old.
- Female patients who have been diagnosed with a femoral fracture.
- Patients treated surgically with intramedullary nailing, or plate fixation.
- Patients with complete medical and follow-up records are available.

Exclusion Criteria

- Patients with pathological fractures.
- Patients who have incomplete or missing medical records.
- Patients with severe associated systemic injuries.
- Patients treated with conservative therapy (without surgery).

Data Collection: Medical records, surgical notes, X-rays, and follow-up records were accessed and reviewed from a retrospective perspective. From patient demographics, fracture types, surgery performed, complications, and follow-up information were systematically collected. Follow-up visits were conducted to evaluate fracture union and implant status with radiographic evaluations.

Variables Collected: The variables collected for analysis included patient age, gender, type and location of femoral fracture, treatment method employed, duration of fracture union, postoperative infection, implant failure, duration of hospitalization, and functional recovery outcomes. Functional status was determined by clinically relevant evaluations of mobility, pain relief, and weight bearing documented by the patient.

Outcome Measures: The most important outcomes were fracture union rate, fracture union time, postoperative complication rates, and the functional recovery status. Secondary outcomes were range of motion, weight bearing, hospital stay and complications related to the implant.

Statistical Analysis: All collected data were analyzed using SPSS software. Patients' characteristics and treatment outcomes were summarized using descriptive statistics including means, percentages and standard deviations.

Categorical variables were compared between the treatment groups by chi-square test whereas the continuous variables were compared by independent t-test. A p value < 0.05 was deemed to be a significant result.

Ethical Considerations: The study was approved by the ethical review committee of the hospital before it began.

The confidentiality and privacy of patients were ensured throughout the research process and any information collected was only used for academic and research purposes.

Results

Demographic Characteristics: In the present retrospective study, 43 patients with a femoral

fracture were included. The age of the studied population was 42.6 ± 13.4 years. Most of the patients were male, indicating that males were more likely to have trauma-related injuries than females. Road traffic accidents were found to be the most frequent mechanism of injury, followed by falls and sports-related trauma.

Table 1: Demographic Characteristics of Patients

Variable	Value
Total patients	43
Mean age	42.6 ± 13.4 years
Male	30 (69.8%)
Female	13 (30.2%)
Road traffic accidents	25 (58.1%)
Falls	12 (27.9%)
Sports injuries	6 (14.0%)

Distribution of Treatment Methods: Intramedullary nailing was used more often than the other surgical procedures among the included patients. The most common indication for plate fixation was in patients who had specific fracture patterns that required anatomical fixation.

Table 2: Distribution of Treatment Methods

Treatment Method	Number of Patients
Intramedullary nailing	25 (58.1%)
Plate fixation	18 (41.9%)

Fracture Union Outcomes: Patients treated with intramedullary nailing demonstrated comparatively faster fracture healing and lower rates of delayed union compared to those managed with plate fixation. In a small number of patients (small number in both treatment groups), non-union was observed.

Table 3: Fracture Union Outcomes

Outcome Variable	Intramedullary Nailing	Plate Fixation
Mean healing time	16.2 weeks	19.4 weeks
Delayed union	2 (8.0%)	4 (22.2%)
Non-union	1 (4.0%)	2 (11.1%)

Complications: Patients undergoing plate fixation were more likely to have postoperative complications. The most frequent complications reported at the follow-up were infection and delayed healing.

Table 4: Postoperative Complications

Complication	Intramedullary Nailing	Plate Fixation
Infection	1 (4.0%)	3 (16.7%)
Implant failure	1 (4.0%)	2 (11.1%)
Malunion	1 (4.0%)	2 (11.1%)
Delayed healing	2 (8.0%)	4 (22.2%)

Functional Outcomes: The functional recovery was comparatively good in patients treated with intramedullary nailing. The majority of the patients in this group achieved adequate functional levels of walking and range of motion at an earlier time than patients who were treated with plate fixation. Additionally, pain relief and weight bearing capacity were greater and faster for patients in the intramedullary nailing group.

Table 5: Functional Outcomes

Functional Parameter	Intramedullary Nailing	Plate Fixation
Independent walking ability	22 (88.0%)	13 (72.2%)
Good pain reduction	21 (84.0%)	12 (66.7%)
Satisfactory range of motion	23 (92.0%)	14 (77.8%)

Statistical Findings: Statistical analysis demonstrated significant differences between the two treatment groups regarding healing time and postoperative complications. A significant decrease

in complications and improvement in functional outcomes was observed when a comparison was made between intramedullary nailing and plate fixation ($p < 0.05$). The difference in the fracture

union time between the two groups was also statistically significant, which favoured intramedullary nailing as an effective surgery for femoral fracture.

Discussion

The present retrospective study was undertaken to compare the results of intramedullary nailing and plate fixation in the treatment of femoral fractures in the patients in, Lok Nayak Jaiprakash Narayan Hospital. The results showed that the intramedullary nailing provided better clinical and functional results when compared with plate fixation. Patients who underwent intramedullary nailing had faster healing times, reduced postoperative complications and better functional outcomes. The decreased rates of delayed union and infection in the intramedullary nailing group could be due to the minimally invasive nature of the procedure and preservation of surrounding soft tissue structures.

Plate fixation needed a wider surgical exposure which can lead to more soft tissue trauma and risk of postoperative infections. Intramedullary nailing was also associated with better functional recovery. More patients from this group were able to walk independently and had an improved range of motion at follow-up. Early mobilization and improved biomechanical stability with intramedullary fixation may contribute to improved rehabilitation outcomes and earlier weight-bearing ability. Although plate fixation remains an effective treatment modality in selected fracture patterns, the present findings indicate that intramedullary nailing may provide superior overall recovery.

Comparison with Previous Studies

The findings of the present study are similar to few orthopedic studies comparing the intramedullary nail with plate fixation. [13] Found faster fracture union, less complications, and earlier mobilization in intramedullary nailed patients. Similar to the current results, numerous studies have confirmed that there is a decreased incidence of infection and greater biomechanical stability with intramedullary fixation. [14] Have shown similar results with the two treatments, especially in fractures that must be anatomically reconstructed, or those that involve the complex distal femoral region. Differences between studies may be due to variations in patient age, fracture type or surgical expertise, rehabilitation program, and length of follow-up. In recent years, plate fixation, due to technological developments of the locking plate and the technique of minimally invasive plate osteosynthesis, has also undergone great improvements in its outcomes [15]. Despite these developments, the current study findings continue to support the effectiveness of intramedullary

nailing as a preferred surgical option in appropriately selected patients.

Clinical Implications: The results of this study have an important clinical relevance for orthopedic surgeons working on the treatment of femoral fractures. The potential benefits of intramedullary nailing in achieving faster healing, fewer complications and better functional outcome make its use desirable in certain fracture types. A knowledge of the relative benefits of both treatment options can help surgeons to decide on a treatment plan tailored to the characteristics of the fracture, patient condition and rehabilitation needs. Better decision making could lead to reduced hospitalizations, earlier return to daily activities, and enhanced patient quality of life.

Strengths of the Study: The real clinical data were collected from the tertiary care hospital, which is one of the main strengths of the present study. The study also offers a direct comparison of two popular orthopedic treatment approaches in a regional health care setting. The findings are further clinically relevant with the inclusion of functional recovery parameters and postoperative complications.

Limitations

Due to the limited number of patients (n=43), the study results may not be generalizable. The retrospective design uses information from previously collected medical records, which could have information bias or may not have been documented. In addition, the period of follow-up was short, and therefore the outcome in terms of functional results and implant-related complications could not be assessed long term.

Future Recommendations

Larger multicenter studies with a variety of patient populations to improve future studies. Randomized clinical trials with prospective data collection may give better data on the comparative effectiveness of intramedullary nailing and plate fixation. Long-term follow-up studies are also suggested to assess the long-term functional recovery, implant durability and late postoperative complications.

Conclusion

This retrospective study demonstrated better clinical and functional outcomes after intramedullary nailing compared to plate fixation in the treatment of femoral fractures. Intramedullary nailing resulted in quicker fracture healing, less complication, and better mobility during the healing process. Both treatment options are viable surgical options, but with the right patients, overall success seemed to be better with intramedullary nailing. This research can help orthopedic surgeons make the better choices when treating patients with

femoral fracture and enhance the post-fracture recovery.

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