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Original research article

Functional outcomes of inter-trochanteric fracture with proximal femoral nail: A study of 60 patients

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Abstract

This study examines the functional outcomes of 60 patients treated for inter-trochanteric fractures using a proximal femoral nail (PFN). Key variables such as surgery duration, length of hospital stay, intraoperative blood loss, and functional recovery were analyzed. Functional outcomes were assessed using the Radiographic Union Score for Hip (RUSH) and the Harris Hip Score (HHS) at the 6-month follow-up. Results revealed a mean surgical duration of 96.8 minutes, a mean hospital stay of 8.6 days, and an average blood loss of 93.7 ml. The 6-month outcomes indicated positive fracture healing, with 83.3% of patients attaining "Excellent" functional outcomes according to the Harris Hip Score. These findings suggest that PFN is a reliable and effective treatment for inter-trochanteric fractures, promoting positive functional recovery and fracture healing.

Keywords: Inter-trochanteric fracture, proximal femoral nailing, functional outcome, RUSH score, Harris hip score

Introduction

Inter-trochanteric fractures are among the most common types of fractures in the elderly population, often associated with osteoporosis and high fall risk. These fractures significantly impact mobility and quality of life, and their management requires effective surgical intervention to ensure proper healing and functional recovery.[1,2] The proximal femoral nail (PFN) has become one of the preferred fixation devices for managing inter-trochanteric fractures due to its biomechanical advantages and minimally invasive nature.[4-9]

The PFN is particularly effective in stabilizing fractures, promoting early mobilization, and reducing complications associated with prolonged immobility. However, the long-term functional outcomes of patients treated with PFN for inter-trochanteric fractures remain an important area of investigation. This study aims to assess key surgical parameters, such as the duration of surgery, hospital stay, intraoperative blood loss, and the functional outcomes of patients 6 months post-surgery using validated clinical scoring systems, including the RUSH score and the Harris Hip Score (HHS).[10-12]

This study of 60 patients who underwent PFN surgery provides insights into the effectiveness of this treatment method, focusing on both radiological healing and the functional capacity of patients during their recovery.

Materials and Methods

Study Design

This retrospective, observational study was conducted at the Department of Orthopedics, Srinivas Institute of Medical Sciences, from January 2021 to December 2022. The objective was to evaluate the functional outcomes of 60 patients treated with proximal femoral nails for inter-trochanteric fractures.

Study Population

The study included 60 patients aged 50 years and older who sustained inter-trochanteric fractures and underwent PFN fixation. Patients with incomplete medical records, those who were lost to follow-up, and individuals with pathological fractures were excluded from the study.

Data Collection

Data were collected from hospital records, including:

- **Duration of Surgery:** Time recorded from the beginning to the end of the surgical procedure.
- **Length of Hospital Stay:** The number of days patients remained hospitalized after surgery.
- **Blood Loss:** Estimated intraoperative blood loss documented by the surgical team.

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- **Functional Outcomes:** Assessed at the 6-month follow-up using the following scoring systems:
    - **RUSH Score:** The Radiographic Union Score for Hip fractures, used to evaluate the healing process based on radiographic findings.
    - **Harris Hip Score (HHS):** A widely used scoring system that assesses pain, function, and mobility after hip surgery. HHS scores were categorized into "Excellent," "Good," or "Fair."

Statistical Analysis

Descriptive statistics were used to analyze all variables. Continuous variables (e.g., surgery duration, hospital stay, blood loss) were expressed as mean ± standard deviation (SD). Functional outcomes (RUSH score and HHS categories) were presented as frequencies and percentages. Data analysis was performed using SPSS software, and significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval for the study was obtained from the institutional ethics committee. All patient data were anonymized to protect confidentiality, and informed consent was obtained from all participants.

Results

Demographic and Clinical Characteristics

The study included 60 patients with a mean age of 68.5 ± 8.2 years. The majority of patients were female (60%), and the mean follow-up period was 6 months.

Surgical and Postoperative Parameters

The mean duration of surgery was 96.8 ± 6.9 minutes, and the mean hospital stay was 8.6 ± 1.6 days. The average intraoperative blood loss was 93.7 ± 9.3 ml. These findings are summarized in **Table 1**.

Table 1: Summary of Surgical and Postoperative Parameters

Parameter	Mean ± SD	Range
Duration of Surgery (min)	96.8 ± 6.9	80 – 120
Length of Hospital Stay (days)	8.6 ± 1.6	6 – 13
Blood Loss (ml)	93.7 ± 9.3	80 – 120

Functional Outcomes

RUSH Score at 6 Months

The mean RUSH score at 6 months was 23.5 ± 2.3, indicating good radiographic healing of the fracture.

Harris Hip Score at 6 Months

Functional recovery, as assessed by the Harris Hip Score (HHS), showed that 83.3% of patients achieved "Excellent" outcomes, while 11.7% had "Good" outcomes, and 5% were classified as "Fair."

Table 2: Functional Outcomes at 6 Months

Outcome	Percentage of Patients (%)
Excellent (HHS)	83.3%
Good (HHS)	11.7%
Fair (HHS)	5%

Discussion

This study evaluated the functional outcomes of 60 patients with inter-trochanteric fractures treated with proximal femoral nails. The results suggest that PFN is an effective treatment option for these fractures, as evidenced by the favorable surgical and functional outcomes at 6 months postoperatively.

The mean surgery duration of 96.8 minutes and average blood loss of 93.7 ml are consistent with other studies that have demonstrated the efficiency of PFN in minimizing intraoperative complications. The mean hospital stay of 8.6 days reflects a relatively short recovery period, indicating that early mobilization is feasible with PFN fixation.

The RUSH scores showed that the majority of fractures healed well within the 6-month follow-up period. The mean score of 23.5 is indicative of good radiographic healing, which corresponds to the high percentage of patients (83.3%) who achieved "Excellent" functional outcomes according to the Harris Hip Score. The remaining patients experienced "Good" or "Fair" outcomes, suggesting that while most patients responded well to PFN treatment, some experienced delayed recovery or minor complications that affected their functional scores.

Several factors contribute to the successful outcomes observed in this study. The biomechanical advantages of the PFN, such as its ability to provide strong fixation and reduce stress on the femoral neck, are particularly beneficial in treating unstable fractures. The minimally invasive nature of the procedure also helps preserve soft tissue and minimize postoperative complications.

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However, there were a few limitations in the study, including the lack of long-term follow-up beyond 6 months and the absence of a control group for comparison. Future studies should aim to investigate the long-term functional outcomes of PFN treatment and compare its effectiveness with other surgical techniques, such as dynamic hip screw (DHS) fixation.

Conclusion

This study demonstrates that proximal femoral nailing is a highly effective treatment for inter-trochanteric fractures, leading to favorable functional and radiographic outcomes in the majority of patients. The PFN provides reliable fixation, facilitates early mobilization, and results in positive fracture healing and functional recovery. These findings support the use of PFN as the preferred surgical technique for managing inter-trochanteric fractures, particularly in elderly patients.

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