

Original article:

The clinico radiological outcome with proximal femoral nail in fixation of intertrochanteric fractures among elderly in a tertiary care centre- a retrospective study

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Date of submission: 02 April 2023

Date of Final acceptance: 27 May 2023

Date of Publication: 02 June 2023

Source of support: Nil

Conflict of interest: Nil

Abstract:

Objective: This retrospective study aimed to assess the clinico-radiological outcome of intertrochanteric fractures treated with the proximal femoral nail (PFN) technique in elderly patients.

Methods: A total of 30 elderly patients with intertrochanteric fractures were enrolled in the study. The patients underwent pre-operative, intra-operative, and post-operative assessments. Clinical outcomes were evaluated using the Harris hip score, while radiological outcomes were assessed using the RUSH SCORE. Descriptive statistics and relevant statistical tests were applied for data analysis.

Results: The mean Harris hip scores showed a progressive improvement over time, with scores of 80.93 at 1 month, 88.80 at 3 months, and 91.93 at 6 months. The mean RUSH SCORE also demonstrated improvement, with scores of 7.53 at 1 month, 8.07 at 3 months, and 8.25 at 6 months. These results indicate favorable clinical and radiological outcomes following the PFN technique. While applying z test, we found significant increase in Harris Hip Score from first to third month. ($P < 0.0045$). Similarly While applying z test, we found significant increase in RUSH Score from first to third month. ($P < 0.0032$).

Conclusion: The results suggest promising clinico-radiological outcomes in elderly patients with intertrochanteric fractures treated with the PFN technique. Further research with larger sample sizes and multicenter designs is warranted to validate these findings.

Keywords: intertrochanteric fractures, proximal femoral nail, clinico-radiological outcome

Introduction:

Intertrochanteric fractures are a common occurrence among the elderly population and pose significant challenges in terms of management and clinical outcomes. These fractures, located in the region between the

femoral neck and the lesser trochanter, often result from low-energy trauma and are associated with osteoporosis.¹ The goal of treatment is to achieve stable fixation and early mobilization to minimize morbidity and improve the quality of life for these patients. In recent years, the proximal femoral nail (PFN) has emerged as a popular choice for the surgical fixation of intertrochanteric fractures. The PFN is an intramedullary device designed to provide stable fixation, preserve the blood supply to the femoral head, and allow early weight-bearing. Its design allows for multiple locking options and minimal soft tissue dissection, which makes it particularly suitable for elderly patients with compromised bone quality.^{2,3}

Tertiary care centers, renowned for their advanced medical facilities and specialized expertise, play a crucial role in managing complex fractures such as intertrochanteric fractures in the elderly. These centers often serve as referral centers for challenging cases and have access to state-of-the-art imaging modalities and multidisciplinary teams that can provide comprehensive care to patients.⁴ The clinico-radiological outcome of intertrochanteric fractures managed with the PFN in a tertiary care center setting is an area of significant interest. Evaluating the outcomes of this surgical technique in a specialized healthcare setting can provide valuable insights into the efficacy, complications, and functional recovery of elderly patients with intertrochanteric fractures.^{5,6,7}

Therefore, this study aims to assess the clinico-radiological outcome of intertrochanteric fractures treated with the PFN technique in a tertiary care center. The findings of this study may help guide clinical decision-making, optimize surgical approaches, and enhance the overall management of intertrochanteric fractures in the elderly population.

Need of study:

Aging is a natural process which no one can defy. As the population continues to age, the number of hip fractures will be expected to increase exponentially. Trochanteric femoral fractures are common in elderly patients.² These fractures are one of the most common fractures in older population due to low energy trauma such as simple fall due to osteoporosis. Intertrochanteric fractures are defined as ‘fractures involving upper end of femur through and in between both trochanters with or without extension into upper femoral shaft. It is universally agreed that the treatment of intertrochanteric fractures is stable internal fixation as early as possible. Stable fixation is the keystone of successful union of trochanteric fractures. Early surgical intervention is advocated in the majority of these patients to reduce the complications associated with long-term immobilization.⁸ The ideal internal fixation device should be such that the patient can be mobilized at the earliest without jeopardizing the reduction, stability and union of the fracture. The main aim of surgery is to mobilize the patient early. It is crucial to use an implant that is minimally invasive, allows early weight bearing, and has low complication rates.⁹

Material and methods:

This retrospective study aimed to evaluate the clinico-radiological outcome of intertrochanteric fractures treated with the proximal femoral nail (PFN) technique in the orthopedic wards of McGann Teaching District Hospital, Shivamogga. The study was conducted from January 2021 to June 2022, with a total duration of 18 months.

A sample size of 30 participants was enrolled in the study. Patients admitted to the orthopedic wards of the hospital who met the inclusion criteria were considered for enrollment. The participants were followed up for six months from the date of enrollment.

The methodology involved three stages:

pre-operative, intra-operative, and post-operative assessments.

In the pre-operative stage, as soon as the patients arrived at the hospital's casualty, they underwent a thorough examination from head to toe, followed by an X-ray to classify the fracture according to the Boyd and Griffith classification. Types 1, 2, and 3 fractures were considered for the study.

During the intra-operative stage, patients were scheduled for surgery under aseptic precautions and appropriate anesthesia. Proximal femoral nailing was performed, and the fracture fixation was confirmed using fluoroscopic guidance.

In the post-operative stage, immediate clinical assessments were conducted, including checking for signs of infection, clinical examination, and blood investigations. Patients were administered post-operative antibiotics and analgesics, followed by early mobilization with the assistance of a walker. Sutures were removed 15 days after surgery. Patients were then followed up for six months at 1, 3, and 6-month intervals, during which the clinical outcomes were assessed using the Harris hip score charting, and radiological assessments were done using the RUSH SCORE.

The inclusion criteria for the study included patients aged 60 years or older with a history of trauma and intertrochanteric fractures visible on X-ray. The patients had to be medically fit for surgery and willing to participate. The exclusion criteria encompassed patients who were not medically fit for surgery, those with associated ipsilateral limb long bone fractures and pelvi-acetabular fractures, patients with neurovascular injuries, and those who were younger than 60 years old.

The collected data was entered into Microsoft Excel and analyzed using SPSS software. Descriptive statistics such as percentages, proportions, means, and standard deviations were applied. The Harris hip score and RUSH SCORE were used to assess both clinical and radiological outcomes. Relevant statistical tests were applied wherever necessary.

Results:

Table 1) Patient outcome assessment

| Assessment | Mean | Standard Deviation |
|-----------------------------|-------|--------------------|
| Harris Hip Score (1 month) | 80.93 | 3.75 |
| Harris Hip Score (3 months) | 88.80 | 2.78 |
| Harris Hip Score (6 months) | 91.93 | 2.79 |
| RUSH SCORE (1 month) | 7.53 | 0.49 |
| RUSH SCORE (3 months) | 8.07 | 0.43 |
| RUSH SCORE (6 months) | 8.25 | 0.41 |

The mean Harris hip scores improved progressively over time, indicating a favorable clinical outcome. At 1 month, the mean score was 80.93, which increased to 88.80 at 3 months and further improved to 91.93 at 6 months. This upward trend suggests a gradual recovery in hip function and mobility following the PFN procedure. The radiological outcomes were evaluated using the RUSH SCORE, which assesses the alignment and healing of the fracture. The mean RUSH SCORE also showed improvement over the follow-up period. At 1 month, the mean score was 7.53, which increased to 8.07 at 3 months and 8.25 at 6 months. These findings indicate satisfactory radiological healing and alignment of the fracture.

Table 2) Patient outcome assessment using test of significance.

| Assessment | Mean | Standard Deviation | Test of significance (Z test) P value | Result |
|-----------------------------|-------|--------------------|---|-------------|
| Harris Hip Score (1 month) | 80.93 | 3.75 | P= 0.0045 | Significant |
| Harris Hip Score (6 months) | 91.93 | 2.79 | | |
| RUSH SCORE (1 month) | 7.53 | 0.49 | P= 0.0032 | Significant |
| RUSH SCORE (6 months) | 8.25 | 0.41 | | |

(P < 0.05 = Significant statistically)

While applying z test, we found significant increase in Harris Hip Score from first to third month. (P= 0.0045). Similarly While applying z test, we found significant increase in RUSH Score from first to third month. (P= 0.0032).

Discussion:

The present study aimed to evaluate the clinico-radiological outcome of intertrochanteric fractures treated with the proximal femoral nail (PFN) technique. The results obtained from the analysis of 30 patients revealed important insights into the efficacy of this surgical approach.

The clinical outcomes were assessed using the Harris hip score, which measures the functional status of the hip joint. The mean Harris hip scores improved progressively over time, indicating a favorable clinical outcome.^{10,11} At 1 month, the mean score was 80.93, which increased to 88.80 at 3 months and further improved to 91.93 at 6 months. This upward trend suggests a gradual recovery in hip function and mobility following the PFN procedure. The radiological outcomes were evaluated using the RUSH SCORE, which assesses the alignment and healing of the fracture. The mean RUSH SCORE also showed improvement over the follow-up period. At 1 month, the mean score was 7.53, which increased to 8.07 at 3 months and 8.25 at 6 months. These findings indicate satisfactory radiological healing and alignment of the fracture.¹²

While applying z test, we found significant increase in Harris Hip Score from first to third month. (P<0.0045). Similarly While applying z test, we found significant increase in RUSH Score from first to third month. (P<0.0032). The results of this study are consistent with previous research that supports the use of PFN in the treatment of intertrochanteric fractures. The PFN technique provides stable fixation and allows for early mobilization, which can contribute to better clinical outcomes. The findings also highlight the importance of post-operative care, including appropriate antibiotic use, pain management, and early mobilization, in optimizing patient recovery.

It is important to acknowledge the limitations of this study. The retrospective design and small sample size may introduce biases and limit the generalizability of the findings. Additionally, the study was conducted at a single center, which may affect the variability of results. Further studies with larger sample sizes and multicenter designs are warranted to validate these findings.

Conclusion:

In conclusion, the results of this retrospective study demonstrate promising clinico-radiological outcomes in elderly patients with intertrochanteric fractures treated with the PFN technique. The use of PFN appears to be associated with improved hip function and radiological healing. These findings contribute to the existing body of evidence supporting the use of PFN as a viable treatment option for intertrochanteric fractures. Future research should focus on comparative studies and long-term follow-up to further assess the benefits of PFN and optimize patient outcomes.

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