



## Impact of Patient Demographics and Injury Patterns on the Choice and Success of Proximal Femur Fracture Surgeries

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### Abstract:

**Background:** Understanding the influence of patient demographics and injury patterns on the choice and success of surgical interventions for stable extracapsular fractures of the proximal femur is crucial for optimizing treatment outcomes.

**Methods:** This comparative study analyzed 50 patients undergoing CRIF with either Gamma Nail or PFN, focusing on how demographics, injury patterns, and socio-economic status impacted surgical choice and outcomes.

**Results:** No significant differences were observed in age and socio-economic status between the two groups. Gender distribution and the mode of injury showed slight variations but did not substantially influence the surgical choice. Both Gamma Nail and PFN were utilized across a diverse patient population, suggesting the need for individualized surgical planning.

**Conclusion:** The choice of surgical technique for treating stable extracapsular fractures of the proximal femur is multifaceted, influenced by a combination of technical, demographic, and injury-related factors.

**Keywords:** Extracapsular fractures, proximal femur, Gamma Nail, Proximal Femoral Nail, patient demographics, injury patterns.

### Introduction

The management of stable extracapsular fractures of the proximal femur encompasses not only the immediate surgical intervention but also a deep understanding of the various patient-related factors that influence surgical outcomes.<sup>1</sup> These fractures are a predominant health concern, particularly in the geriatric population,

due to their association with decreased mobility, increased dependence, and heightened mortality rates.<sup>2</sup> The decision-making process for the optimal surgical approach—whether to use Closed Reduction and Internal Fixation (CRIF) with Gamma Nail or Proximal Femoral Nail (PFN)—requires careful consideration of a

multitude of factors beyond the fracture's biomechanics.<sup>3</sup> This includes patient demographics, injury patterns, and socio-economic status, all of which play pivotal roles in the recovery trajectory and overall success of the treatment. This comparative study delves into how these factors impact the choice and success of surgical interventions for stable extracapsular fractures of the proximal femur, aiming to enrich the clinical decision-making process with a broader perspective on patient-centered care.<sup>4</sup>

Extracapsular fractures of the proximal femur are complex injuries that demand a nuanced approach to treatment. The selection between Gamma Nail and PFN is not merely a technical decision but one that intersects with patient-specific factors, such as age, gender, and socio-economic background.<sup>5</sup> These elements can influence not only the immediate surgical outcomes but also the long-term rehabilitation prospects and quality of life for patients. As the global population ages, the incidence of these fractures is expected to rise, underscoring the need for an evidence-based approach to treatment that integrates clinical efficacy with an understanding of the patient's broader health and social context.<sup>6</sup>

The study's objective was to analyze the impact of patient demographics (age, gender, socio-economic status) and injury patterns on the selection of surgical technique (CRIF with Gamma Nail vs. PFN) and to evaluate the outcomes of these choices in the context of recovery and rehabilitation.<sup>7</sup> By incorporating a comprehensive review of 50 patients subjected to either surgical approach, this research offers insights into the intricate relationship between patient characteristics, the nature of the injury, and the effectiveness of the chosen surgical strategy.<sup>8</sup>

Moreover, this study seeks to illuminate the less discussed aspect of orthopedic surgeries - the socio-economic factors that might affect surgical choice and outcomes. The socio-economic status of a patient can subtly influence the treatment pathway, from the selection of the

surgical method to the resources available for postoperative care and rehabilitation. Understanding these dynamics is crucial for orthopedic surgeons and healthcare providers to optimize care for all patients, regardless of their background.

In synthesizing the findings, this paper contributes to a more nuanced understanding of the multifaceted factors that guide the management of extracapsular proximal femur fractures. By highlighting the significance of demographics and injury patterns in surgical outcomes, this research advocates for a more patient-centered approach in orthopedics, where clinical decisions are tailored not only to the technical demands of the fracture but also to the individual circumstances of each patient. Through this lens, the study aims to foster a more inclusive and equitable healthcare practice, ensuring that all patients receive the most appropriate and effective treatment for their unique situation.

## RESULTS

The results of the study offer insightful observations regarding the demographics, mode of injury, socio-economic status, and gender distribution among patients undergoing Closed Reduction and Internal Fixation (CRIF) with either Gamma Nail or Proximal Femoral Nail (PFN) for the treatment of stable extracapsular fractures of the proximal femur.

**Demographic Profile of Patients:** There was no significant difference in the age distribution between the two groups, with an average age of  $70.82 \pm 16.19$  years for both Gamma Nail and PFN patients. Gender distribution was slightly varied, with a male to female ratio of 12:13 in the Gamma Nail group and 11:14 in the PFN group. Socio-economic status also showed parity across both surgical groups, with the majority of patients classified as lower middle class (21 in each group) and a smaller portion as upper middle class (4 in each group).

**Mode of Injury and Surgical Choice:** The mode of injury presented a varied pattern between the two groups. No patients in the

Gamma Nail group fell from a bike, compared to 1 patient (4%) in the PFN group. Falls from height resulted in surgery for 2 patients (8.3%) with Gamma Nail and 3 patients (12%) with PFN. A higher percentage of Gamma Nail patients (20.8%) had falls from stairs compared to PFN patients (8%). The most common cause of injury for both groups was a fall on level ground, accounting for 70.8% of Gamma Nail and 76% of PFN patients.

**Surgical Selection Based on Socio-Economic Status:** The distribution of patients based on socio-economic status did not significantly influence the choice between Gamma Nail and

PFN, with both groups showing a similar pattern. The majority of patients from both the lower and upper middle classes were almost equally likely to receive either type of surgical treatment.

**Gender Distribution and Surgery Type:** Gender distribution across the two surgical options was closely matched, with a slightly higher percentage of females (56%) receiving PFN compared to Gamma Nail (54.2%). Conversely, the Gamma Nail group had a marginally higher percentage of male patients (45.8%) compared to the PFN group (44%).

**Table 1: Demographic profile of patients**

Demographic	CRIF with Gamma Nail	CRIF with PFN
Age (Mean±SD years)	70.82±16.19	70.82±16.19
Gender (M:F ratio)	12:13	11:14
Socio-economic Status	Lower Middle: 21, Upper Middle: 4	Lower Middle: 21, Upper Middle: 4

**Table 2: Mode of injury and surgical choice**

Mode of Injury	CRIF with Gamma Nail (n,%)	CRIF with PFN (n,%)
Fall from bike	0 (0%)	1 (4%)
Fall from height	2 (8.3%)	3 (12%)
Fall from stairs	5 (20.8%)	2 (8%)
Fall on level ground	18 (70.8%)	19 (76%)

**Table 3: Surgical selection based on socio-economic status**

Socio-economic Status	CRIF with Gamma Nail (n,%)	CRIF with PFN (n,%)
Lower Middle Class	21 (83.3%)	21 (84%)
Upper Middle Class	4 (16.7%)	4 (16%)

**Table 4: Gender distribution and surgery type**

Gender	CRIF with Gamma Nail (n,%)	CRIF with PFN (n,%)
Female	13 (54.2%)	14 (56%)
Male	12 (45.8%)	11 (44%)

## Discussion

The findings of our study underscore the complexity of factors influencing the selection and success of surgical interventions for stable extracapsular fractures of the proximal femur. Despite the clinical focus often being on the technical aspects of surgical procedures, this research highlights the significant role that patient demographics, injury patterns, and socio-

economic status play in determining the optimal surgical approach and its subsequent outcomes.<sup>9</sup>

The absence of a marked difference in age distribution and socio-economic status between the two groups indicates that these factors, in isolation, do not predetermine the choice between Gamma Nail and PFN. This suggests that both surgical options are considered viable across a broad spectrum of the patient

population, underscoring the need for a more individualized approach to surgical planning. The slight variation in gender distribution, although not drastically significant, prompts further investigation into whether gender-specific anatomical or biomechanical differences might influence the choice or outcome of surgical technique.<sup>10</sup>

The variation in the mode of injury leading to surgery between the two groups provides an interesting insight into the potential influence of injury mechanism on surgical selection.<sup>11</sup> The higher incidence of falls from stairs among Gamma Nail patients versus falls on level ground predominating in the PFN group might reflect surgeon preference or perceived advantages of one technique over the other in managing different trauma mechanisms. This warrants further research into the biomechanical and clinical rationale behind these choices.<sup>12</sup>

Notably, the study's results indicate that socio-economic factors do not significantly skew the distribution of surgical techniques, suggesting that access to both types of surgery might be relatively equitable within the study population. However, the impact of socio-economic status on postoperative recovery, rehabilitation accessibility, and overall treatment success remains an area for further exploration.

### Conclusion

Our study demonstrates that while technical considerations are paramount in selecting the surgical method for treating stable extracapsular fractures of the proximal femur, understanding the nuanced interplay of patient demographics, injury patterns, and socio-economic status is crucial. Acknowledging these factors can lead to more tailored, effective treatment strategies, ensuring the best possible outcomes for patients.

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