

Comparison of Peri and Early Post-Operative Complications in Long Versus Short Proximal Femoral Nail for Unstable Proximal Femoral Fractures

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ABSTRACT

Objective: To compare peri and early post-operative complications in long versus short proximal femoral nails for unstable proximal femoral fractures.

Study Design: Quasi-experimental study.

Place and Duration of Study: Orthopaedic Department, Combined Military Hospital, Lahore Pakistan, Jan to Sep 2021.

Methodology: We included all the patients who suffered from unstable proximal femur fractures diagnosed by a consultant orthopedic surgeon based on clinical and radiological findings. They were randomly divided into two groups. Group-A was managed by a long proximal femoral nail, while Group-B was managed by a short proximal femoral nail. Both groups were compared for peri- and early post-operative complications.

Results: The final analysis included 110 patients. The mean age of the study participants was 63.66±8.553 years. 79(71.8%) were male, while 31(28.2%) were female. Peri- and early post-operative complications were not statistically different in both groups except for the duration of surgery. Patients undergoing long proximal femoral nail fixation had more chances of having surgery lasting more than 40 minutes than patients undergoing short femoral nail fixation (*p*-value-0.004).

Conclusion: The peri- and early post-operative complications rate was almost similar in both groups. Patients undergoing long proximal femoral nail fixation had more chances of having prolonged surgery than patients undergoing short femoral nail fixation.

Keywords: Complications; Femoral fracture, Intramedullary nail.

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INTRODUCTION

Fractured bones have always been challenging for healthcare professionals, even before the modern era of advanced operative procedures. Current statistics around the globe have been alarming regarding the epidemiology of fractures of various bones of the body in all age groups.¹ Fractures of the lower limb, especially the femur, have been areas of concern for orthopaedic and trauma experts due to the complexity of management and variable short and long-term outcomes.²

Femoral fractures have various types, and treatment options are usually tailored according to the fracture type and multiple other factors³. Proximal femoral fractures have been commonly encountered in trauma and orthopedic practice.⁴ Early anatomical reduction, surgical fixation, cancellous screws, sliding hip screws, intramedullary nails, and implants are methods used in routine to manage patients suffering

from proximal femur fractures.⁵ All these procedures have their own merits and demerits.

Studies have been done regarding complications related to intramedullary nailing procedures for proximal femur fracture. Jackson *et al.* summarized that the complication rate of different surgical modalities used to manage proximal femur fracture was similar.⁶ Blum *et al.* in 2020 in their study came up with a conclusion that short nails were associated with more stiffness in joints around A1 and A3 fractures as compared to long nails.⁷ Early complications following the use of proximal femur nailing in sub-trochanteric fractures were studied by Kanthimathi *et al.* concluded that the complication rate in this procedure was around 20%, but it included all peri-operative, early post-operative, and late complications.⁸

Femur fractures affect the quality of life of patients of all age groups. Complications of treatment may worsen the situation and pose a significant burden and psycho-social impact on individuals as well as the health care system.⁹ A local study has been published regarding trends of treatment options used to manage such fractures, 10 but limited local data

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has been available regarding the comparison of complications of various treatment modalities, especially peri and early post-operative complications. Therefore, we planned this study to compare peri and early post-operative complications in the long versus short proximal femoral nails for unstable proximal femoral fractures.

METHODOLOGY

The quasi-experimental study conducted at the Orthopaedic Department, Combined Military Hospital, Lahore Pakistan, from January to September 2021 after approval was obtained from the Institutional Review Board Committee. The sample size was calculated using the WHO sample size calculator, using the population proportion of complications with proximal femoral nailing as 20%.⁸ The non-probability consecutive sampling technique was used to gather the sample.

Inclusion Criteria: Patients of either gender, over 55 years, presenting with an unstable proximal femur fracture were included.

Exclusion Criteria: Patients with pathological fractures, redo surgeries, or open fractures, patients with polytrauma or those who refused surgical management were not included.

Patients were diagnosed with unstable proximal femur fractures by a consultant orthopedic or trauma surgeon using clinical and radiological methods.^{11,12} Patients presenting with unstable proximal femur fractures were included in the study after applying the inclusion criteria. Patients were randomly divided into two groups before surgery (Figure).

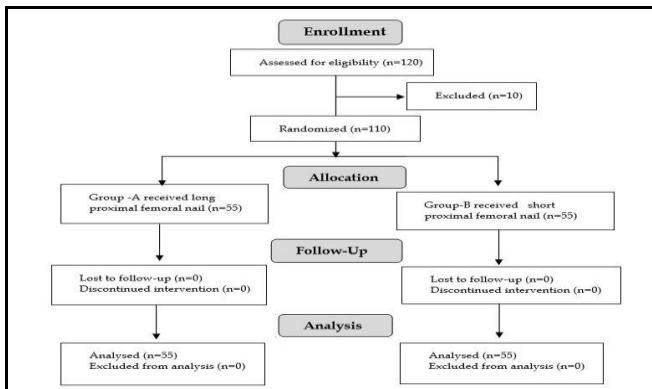


Figure: Patient Flow Diagram (n=110)

Both groups underwent routine baseline investigations and pre-anesthesia assessment. Both groups received routine anesthetic medications before

and during the surgery. The long proximal femoral nail was managed in Group-A. In contrast, Group-B was managed by a short proximal femoral nail. Both groups were observed during the surgery and seventy-two hours after the surgery to look for any peri or early post-operative complications. Anterior knee pain after surgery was considered significant on a visual analog scale score of more than six.¹³

Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) version 26:00. Mean and standard deviation were calculated for the patients' ages. Frequency and percentage were calculated for all the complications. Pearson chi-square and Fischer exact tests were applied to look for statistically significant differences in peri- or early post-operative complications in both study groups. The *p*-value less than or equal to 0.05 was essential to establish the significant difference.

RESULTS

A total of 110 patients were included in the final analysis. The mean age of the study participants was 63.66±8.553 years. Out of 110 patients with femoral fractures, 79(71.8%) were male, while 31(28.2%) were female (Table-I). 65(59.1%) patients had right-sided femoral fractures while 45(40.1%) had left-sided femoral fractures. 50(45.4%) patients required transfusion during the surgery, while 60(54.6%) had surgery without blood transfusion.

Peri- and early post-operative complications were not statistically different in both groups except for the duration of surgery. Patients undergoing long proximal femoral nail fixation had more chances of having surgery lasting more than 40 minutes than patients undergoing short femoral nail fixation (*p*-value -0.004) (Table-II).

Table-I: Demographic Details of Study Participants (n=110)

| Study Parameters | n(%) |
|-----------------------------|---------------------|
| Age (years) | |
| Mean±SD | 63.66±8.553 years |
| Range (min-max) | 55 years-76 years |
| Mean Duration Of Surgery | 69.74±7.883 minutes |
| Gender | |
| Male | 79(71.8%) |
| Female | 31(28.2%) |
| Anatomical Site | |
| Right | 65(59.1%) |
| left | 45(40.9%) |
| Method used | |
| Long proximal femoral nail | 57(51.8%) |
| Short proximal femoral nail | 53(48.2%) |

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Table-II: Difference in Complications in Both the Study Groups (n=110)

| Complications | Long Proximal Femoral Nail | Short Proximal Femoral Nail | p-value |
|-----------------------------------|----------------------------|-----------------------------|---------|
| Duration of Surgery | | | |
| <90 minutes | 46(80.7%) | 37(69.8%) | 0.004 |
| >90 minutes | 11(19.3%) | 16(30.2%) | |
| Transfusion During Surgery | | | |
| No | 34(59.6%) | 6(49.1%) | 0.323 |
| Yes | 23(40.4%) | 27(50.9%) | |
| Infection | | | |
| No | 53(92.9%) | 50(94.3%) | 0.770 |
| Yes | 04(7.1%) | 03(5.7%) | |
| Anterior Knee Pain | | | |
| No | 51(89.4%) | 52(98.1%) | 0.050 |
| Yes | 06(10.6%) | 01(1.9%) | |

DISCUSSION

Proximal femoral nailing procedures have been in practice for quite some time with good clinical outcomes. These procedures can be done in a number of ways, but short and long nailing are popular among orthopedic and trauma surgeons.¹⁴ Multiple complications have been reported with nailing procedures, but limited work has been done regarding comparing complication rates between short and long proximal femoral nailing. Sometimes complications occur during surgery, which may impact surgical outcomes long-term. We, therefore, conducted this study to compare peri and early post-operative complications in the long versus short proximal femoral nails for unstable proximal femoral fractures.

Matsumura *et al.*¹⁵ conducted a retrospective data analysis on trochanteric hip fracture patients who had undergone internal fixation. They found that both types of femoral nails were effective and ineffective in managing these fractures, and peri- or early postoperative complications were minimal. We did not compare the effectiveness of both modalities but compared peri- and early operative complications in long and short proximal femoral nail fixation, and there was no significant difference in any of the complications.

A Brazilian study published by Barbosa *et al.*¹⁶ studied elderly patients for complications during and after the surgery and mortality related to the procedure. They concluded that septic shock was the common cause of mortality among their study participants. A total of 7(3.3%) patients had evidence of post-surgical infection in our study, but there was no statistically significant difference in patients in both groups regarding this complication. We cannot

conclude that the femur length used by our study participants had any association with complications.

Horwitz *et al.*¹⁷ in 2016 looked for the role of nail length while managing the fractures of the femur bone of the intertrochanteric region. They highlighted that the effectiveness and complications of both short and long nails are similar, and the treating team needs to consider many other socio-demographic and clinical factors while choosing the size of the nail used in managing the femur fracture. Except for the long duration of surgery, we did not find any significant difference in peri or early postoperative complications of both procedures.

Vaughn *et al.* studied complication rates among patients undergoing short vs lengthy nail procedures for managing femoral fractures.¹⁸ They concluded no significant difference in complications except the increased risk of secondary femur fracture with short cephalomedullary nails. Our study was different in that we only studied peri or early postoperative complications so that data could be compiled for treating surgeons regarding problems they could face during the surgery. We concluded that all peri-operative parameters were not different except for the long duration of surgery in both groups.

LIMITATIONS OF STUDY

There were a few limitations in our study. Multiple factors may cause complications instead of the nailing procedure itself. Controlling the confounding factors and effect modifiers for the presence of complications among patients undergoing this orthopedic procedure may show better results.

CONCLUSION

The peri- and early post-operative complication rates were similar in both groups. Patients undergoing long proximal femoral nail fixation had more chances of having prolonged surgery than patients undergoing short femoral nail fixation.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SM & MI: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MJM & ASM: Study design, drafting the manuscript, critical review, approval of the final version to be published.

SW & HR: Conception, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of

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any part of the work are appropriately investigated and resolved.

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