Original Article
DOI: https://doi.org/10.70749/ijbr.v3i3.2546

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Comparison of Proximal Femoral Nail and Dynamic Hip Screw in Intertrochanteric Fracture

Muhammad Siqaf Anjum[1], Aimal Sattar[1], Waheed Anwar[1], Syed Haseeb Ullah Shah[1], Aiman Usman Lodhi[2], Hamid Nawaz[1]

[1]Department of Orthopedics, Lady Reading Hospital, Peshawar, KP, Pakistan.
[2]Neurology Department, Hayatabad Medical Complex, Peshawar, KP, Pakistan.

ARTICLE INFO

Keywords: Femur Intertrochanteric Fractures, Dynamic Hip Screw, Proximal Femoral Nail.

Correspondence to: Aimal Sattar, Department of Orthopedics, Lady Reading Hospital, Peshawar, KP, Pakistan.
Email: draimalsattar@gmail.com

Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 08-01-2025 Revised: 10-03-2025
Accepted: 23-03-2025 Published: 31-03-2025

ABSTRACT

Background: Femur intertrochanteric fractures are the most frequent hip fractures. Its frequency is increasing as a result of the growing elderly population. **Objective:** Comparison of the outcomes of dynamic Hip Screw and proximal femoral nail in intertrochanteric fracture. **Material and method:** The present randomized control trail was carried out at the Department of Orthopedics Lady Reading Hospital Peshawar over a period of 6 months from July 2024 to January 2025 after taking approval from the research committee of the hospital. Individuals with femur intertrochanteric fractures (ASA class l/II of both genders and different age group (ranged 30-70 years) were included in this study. Non-probability consecutive sampling technique was used for collection of sample and sample size was determined through Open Epi sample size calculator. The sample size determined was 470 individuals. The study participants were equally divided in to group A (DHS) and B (PFN). Both groups had same number of individuals. In group A individuals underwent a standard lateral approach to the proximal femur while positioned supine on a fracture table. In group B, patients underwent a standard lateral approach to the proximal femur while lying supine on a fracture table. Following surgery, all patients were given injectable antibiotics, oral antibiotics till the sutures were taken out, and an intravenous cephalosporin for five days. On the second or third postoperative day, static quadriceps strengthening activities were initiated. The last follow-up and Harris hip score (HHS) evaluation was done six months later. All the data was analyzed using SPSS version 26. **Results:** A total of 470 individuals were enrolled in this study and were divided in to group A and B and each group had same number of individuals. Group A had received dynamic hip screw while group B underwent proximal femoral nail for the management of intertrochanteric femoral fractures. The mean age of the individuals in group A was 38.28±25.88 years and in group B was 44.73±15.25 years. When compared to DHS Group-A, the PFN Group-B demonstrated noticeably less blood loss (p-value<0.001) and operational time (p-value<0.001). **Conclusion:** The present study concluded that proximal femoral nail is a much better alternative than dynamic Hip Screw for treating femur intertrochanteric fractures.

INTRODUCTION

Femur intertrochanteric fractures (IFFs) are the most frequent hip fractures, and they are particularly common in osteoporotic age-related bones due to having little to no effect. The frequency of IFFs is increasing daily as a result of the growing elderly population.[1] IFFs mostly affect the osteoporotic bones of the elderly population, which results in substantial morbidity and death. Concurrent diseases including diabetes, hypertension, heart, kidney, and pulmonary issues exacerbate the insult, but IFFs also carry potentially fatal side effects like pneumonia, catheter-related urosepsis, decubitus ulcers, deep vein thrombosis, and cardiopulmonary failure. Therefore, a prompt surgical treatment that aims for the patient's quickest mobility and rehabilitation is essential.[2] However, conservative therapy resulted in varus deformity, external rotation shortening, vicious callus development, limping gait, and finally a significant death rate because of prolonged immobility. The majority of surgeons now choose dynamic hip screws for surgical treatment; but, if weight bearing is started too soon, particularly in cases of complicated and comminuted fractures, the tool might have a propensity to pierce or retract through the femur head. Development of the several novel implants is the result of the search for the ideal surgical solution that aims for reduced rates of complications and quicker recovery is now preferred by many in IFFs, and the literature of the recent past three years has progressively supported its

function due to its placement close to the body's mechanical axis, which decreases the implant's lever arm aspect. Additionally, they allow for early weight-bearing activities and may be inserted quickly with minimum blood loss. An intramedullary instrument is the proximal femoral nail.[3] In a prospective study, Ranjeetesh Kumar et al. compared DHS and PFNA and discovered that PFN had better functional outcomes in patients with osteoporotic bones and unstable fracture patterns.[4] Intramedullary device proponents argue that DHS has fewer rates of operational complications and a quicker recovery with PFNA [5-6], whereas others continue to see DHS as the first line therapy since it is affordable, dependable, and easily accessible. DHS vs. PFN is still up for debate.[7] Therefore the present study was carried out to explore the comparative outcomes of proximal femoral nail and dynamic Hip Screw in intertrochanteric fracture.

MATERIAL AND METHOD

The present randomized control trail was carried out at the Department of Orthopedics Lady Reading Hospital Peshawar over a period of 6 months from July 2024 to January 2025 after taking approval from the research committee of the hospital. Individuals with femur intertrochanteric fractures (ASA class l/II of both genders and different age group (ranged 30-70 years) from department of Orthopedics, LRH Peshawar were included in this study. individuals with pathological fractures, open fractures, history of diabetes and psychiatric disorder were excluded. sample size was determined through Open Epi sample size calculator with level of significance 5% with power = 80%. the sample size determined was 470 individuals. Randomization was performed by computer generated list and the study participants were equally divided into group A (DHS) and B (PFN). Both groups had same number of individuals. A detailed explanation about participation in the trial was provided to the patient, and informed permission was acquired, elucidating the associated risks and benefits comprehensively. At study entry baseline demographics (age, gender. fracture type, and duration of fracture, BMI, socioeconomic status, educational level, residential status, profession and ASA class) were recorded. In group A individuals underwent a standard lateral approach to the proximal femur while positioned supine on a fracture table. Following closed reduction a guide wire was inserted into the femoral head and neck. A DHS plate was positioned along the lateral aspect of the proximal fem, and a leg screw was inserted over the guide wire, engaged the femoral head and neck. The DHS plate was secured to the femur with cortical screws, and the wound was closed in layers. In group B, patients underwent a standard lateral approach to the proximal femur while lying supine on a fracture table. Following closed reduction under fluoroscopic guidance, an appropriately sized PFN was inserted into the proximal, followed by the placement of distal locking screws to provide rotational stability. Next, proximal locking screws (hip pins) were inserted into the femoral head and neck to secure the fracture repair, and the wound was closed in layers. Post-surgery, all patients received injectable antibiotics, oral antibiotics till suture removal, then intravenous cephalosporin for five days. Static quadriceps strengthening exercises were started on the second or third postoperative day. The drain, if positioned, was subsequently removed after the third postoperative day. The sutures were excised after a period of 10 to 14 days. The patients were moved independently as soon as localized discomfort or overall condition allowed. Partial support commenced six weeks post clinical and radiological evaluation, whereas full support was initiated twelve weeks following the assessment. A final follow-up and evaluation using the Harris Hip Score (HHS) were assessed six months later. Data regarding functional outcomes (Excellent, Good, Fair) were noted as per operational definition from both groups and recorded on especially designed profornra. All the data was analyzed using SPSS version 26. For qualitative variables like type of fracture, socioeconomic status, profession, education status frequencies and percentages were computed. Mean ±SD or Median (lQR) for non-normal data were presented for quantitative variables like age, monthly income, duration of fracture, BMI VAS score and the Shapiro-Wilk test was used to check the normality. Chi-square test Fishers was applied to compare postoperative pain in both groups. The P value <0.05 was considered statistically significant. Stratification was done with regard to age, gender, type of fracture, duration of fracture, BMl, socioeconomic status, education level, residential status , monthly income, profession and ASA class to see the effect of these on functional outcome, Post stratification using the chi-square test or Fisher's exact test for both groups were tested , p <0.05 considered statistically significant.

RESULTS

A total of 470 individuals were enrolled in this study and were divided in to group A and B and each group had same number of individuals .group A had received dynamic hip screw while group B underwent proximal femoral nail for treatment of intertrochanteric femoral fractures. The mean age of the individuals in group A was 38.28±25.88 years and in group B was 44.73±15.25 years. The mean BMI in DHS group was 23.52±3.35 and in PFN was 24.14±3.35kg/m2. Male gender in group A was 77% and in B group was 74.8%. Majority of the individuals in both groups were Illiterate (51% vs 46%).Demographic features of the study population has been shown in **table 1**.The mean operative time in PFN group was 37.90±3.55 while in DHS 50.55±8.77 minutes. Mean blood loss was 80.43±16.99 in group B and 190.3±38.9 ml in group A. When compared to DHS Group-A, the PFN Group-B demonstrated noticeably less blood loss (p-value<0.001) and operational time (p-value<0.001). The PFNA group's Harris hip score at one month was 30.10+4.07, whereas the DHS group's was 29.10+3.17(P 0.255). At three months, the PFNA group's Harris hip score was 87.67+1.22, whereas the DHS group's was 80.67+0.96 (p=0.000). The PFNA group had a fracture duration distribution of 4.55+2.23 days, whereas the DHS group saw a fracture duration of 4.24+1.95 days (p=0.484).

Table 1

Demographic features of the study participants between the two groups

Features	Group A((DHS) n=235	Group (PFN) n= 235	Value of P
Gender			0.7000
Male	181(77%)	176(74.8%)	

Female	54(23%)	149(25.1%)	
Age in years mean± SD	38.28±25.88	44.73±15.25	0.186
Body mass index (kg/m2)	23.52±3.35	24.14±3.35	0.416
Socioeconomic status			
Poor	90(38.2%)	100(42.5%)	
Middle class	80(34%)	70(29.7%)	0.43
High class	55(23.4%)	65(27.6%)	
Education level			
Illiterate	120(51%)	110(46%)	0.6%
Literate	115(49%)	125(54%)	

Table 2

Comparative outcomes of proximal femoral nail and dynamic Hip Screw in intertrochanteric fracture

Variables	Group A((DHS) n=235	Group B(PFN) n= 235	Value of P
Blood loss in ml	190.3±38.9	80.43±16.99	<0.001
Operative time in minutes	50.55±8.77	37.90±3.55	<0.001
Harris hip score at1 month	29.10+3.17	30.10+4.07	0.255
Harris hip score at 3 months	80.67+0.96	87.67+1.22	0.000
Duration of fracture in days	4.24+1.95	4.55+2.23	0.484

DISCUSSION

Proximal femurs are among the most often Orthopaedic surgeons came upon fractures. Hip fractures with little energy that result in proximal fractures of the femur occur more than 250000 times annually in the America.[8]The International Osteoporosis Foundation estimates that there are around 1.6 million hip every year, fractures happen. This number might increase to 6 million each year by 2050.[9]AO is one of the most thorough and commonly recognized classification systems for proximal femoral fractures, while there are other approaches as well. While A2 and A3 fractures are unstable, A1 fractures are often stable.[10] For these, operational intervention is recommended. Fractures as a result of the early mobility benefit and decreased issues brought on by extended immobilization. [11] Treatment options for these fractures include intramedullary or extramedullary devices, such as DHS such as Proximal Femoral Nails (PFN) devices.[12]Because they lack lateral cortex, extramedullary devices like DHS might cause problems including management of the femoral shaft. Because the extramedullary device is prone to loss of reduction because it lacks lateral buttress, the integrity of the lateral cortex in the 31-A3 category is a distinguishing criterion for implant selection, preferring an intramedullary device.[13]

According to biomechanical research, helical blades used in PFNA provide more stability in terms of translational and rotational displacements, hence maintaining the reduction quality.[14] The whole length of the helical blade is not pre-drilled, and the tip of the blade is maintained 10 mm from the articular surface of the femur head in order to prevent the catastrophic consequence of "cut through.[15] The present study was carried out to compare the outcomes of proximal femoral nail and dynamic Hip Screw in intertrochanteric fracture. In our study the mean operative time in PFN group was 37.90±3.55 while in DHS 50.55±8.77 minutes. Mean blood loss was 80.43±16.99 in group B and 190.3±38.9 ml in group A. When compared to DHS Group-A, the PFN Group-B demonstrated noticeably less blood loss (p-value<0.001) and operational time (p-value<0.001). Our study findings are similar to the study conducted by Geol et al. For patients receiving PFN, the mean blood loss was determined to be 111.8 ml, whereas for the DHS Group, it was 325.6 ml. PFN Group's mean operating time was determined to be 111.6 minutes, whereas DHS Group's was determined to be 106.4 minutes. [16] the results of the current study was also similar to the study conducted by Khan et al in which PFN demonstrated noticeably less blood loss.[17] Eight studies that examined both fixating methods, i.e., PFN overall DHS, for both stable or unstable fractures in terms of operating time, blood loss, length of skin incisions, wound complications, procedures, and mortality were included in a meta-analysis conducted by Zhang et al. According to this meta-analysis, patients treated with PFN had shorter operating times and less blood loss during surgery than those treated with DHS.[18] Our findings closely resemble those of a related research conducted by Ashraf et al., which likewise found that the PFN Group had an average incision length of 4.71+/-0.74 cm, while the DHS Group experienced an average of 7.62+/-0.91 cm.[19] However, after using DHs or PFN for AO/OTA 31A1-3 fractures, Wessels et al. found no difference in the perioperative or postoperative results. However, in the situations of AO/OTA 31A1 & 31A2, functional results might be enhanced in favor of PFN.[20] Such outcomes are caused by PFN, a minimally invasive surgical approach that involves smaller incisions and, as a consequence, less blood loss during the procedure. Because less tissue is dissected and less time is needed to seal the wounds, this also results in a reduced operating time. Sharma's research, which included a sample of 60 patients receiving treatment from PFN and DHS for stable intertrochanteric fractures, similarly reported similar results.[21] In this study at three months, the PFNA group's Harris hip score was 87.67+1.22, whereas the DHS group's was 80.67+0.96 (p=0.000). The PFNA group had a fracture duration distribution of 4.55+2.23 days, whereas the DHS group saw a fracture duration of 4.24+1.95 days (p=0.484).these results are similar to the study of Saleem et al.[22].

CONCLUSION

The present study concluded that proximal femoral nail is a much better alternative than dynamic Hip Screw for treating femur intertrochanteric fractures. In terms of operating time and blood loss, PFN fixation is superior In terms of operating time and blood loss than DHS.

REFERENCES

1. Gullberg, B., Johnell, O., & Kanis, J. (1997). World-wide projections for hip fracture. *Osteoporosis International*, *7*(5), 407-413. https://doi.org/10.1007/pl00004148

2. Bahrs, C., Schreiner, A., Stöckle, U., Klopfer, T., & Hemmann, P. (2018). Per- und subtrochantäre Femurfrakturen. *Der Chirurg*, *89*(10), 837-848. https://doi.org/10.1007/s00104-018-0714-2

3. Jonnes, C., Shishir, S. M., & Najimudeen, S. (2016). Type II intertrochanteric fractures: proximal femoral nailing (PFN) versus dynamic hip screw (DHS). *Archives of Bone and Joint Surgery*, *4*(1), 23. https://pmc.ncbi.nlm.nih.gov/articles/PMC4733231/
4. Kumar, R., Singh, R., & Singh, B. (2012). Comparative prospective study of proximal femoral nail and dynamic hip screw in treatment of intertrochanteric fracture femur. *Journal of Clinical Orthopaedics and Trauma*, *3*(1), 28-36. https://doi.org/10.1016/j.jcot.2011.12.001
5. Zeng, X., Zhang, N., Zeng, D., Zhang, L., Xu, P., Cao, L., Yu, W., Zhan, K., & Zhang, X. (2017). Proximal femoral nail antirotation versus dynamic hip screw fixation for treatment of osteoporotic type 31-a1 intertrochanteric femoral fractures in elderly patients. *Journal of International Medical Research*, *45*(3), 1109-1123. https://doi.org/10.1177/0300060517703277
6. Yu, W., Zhang, X., Zhu, X., Yu, Z., Xu, Y., Zha, G., Hu, J., Yi, J., & Liu, Y. (2016). Proximal femoral nails anti-rotation versus dynamic hip screws for treatment of stable intertrochanteric femur fractures: An outcome analyses with a minimum 4 years of follow-up. *BMC Musculoskeletal Disorders*, *17*(1). https://doi.org/10.1186/s12891-016-1079-7
7. Butt, F. F., Hussain, A. S., Khan, A. M., & Sharif, M. (2017). Implants for extracapsular neck of femur fracture dynamic hip screw versus intramedullary nailing. *Journal of Ayub Medical College Abbottabad*, *29*(4), 697-701. https://ayubmed.edu.pk/jamc/index.php/jamc/article/view/3540
8. Socci, A. R., Casemyr, N. E., Leslie, M. P., & Baumgaertner, M. R. (2017). Implant options for the treatment of intertrochanteric fractures of the hip. *The Bone & Joint Journal*, *99-B*(1), 128-133. https://doi.org/10.1302/0301-620x.99b1.bjj-2016-0134.r1
9. Shen, J., Luo, F., Sun, D., Huang, Q., Xu, J., Dong, S., & Xie, Z. (2015). Mid-term results after treatment of intertrochanteric femoral fractures with percutaneous compression plate (PCCP). *Injury*, *46*(2), 347-357. https://doi.org/10.1016/j.injury.2014.04.033
10. Adeel, K., Nadeem, R., Akhtar, M., Sah, R., & Din, I. (2020). Comparision of proximal femoral nail (Pfn) and dynamic hip screw (Dhs) for the treatment of AO type A2 and A3 Pertrochanteric fractures of femur. *Journal of the Pakistan Medical Association*, *70*(5), 815-819. https://doi.org/10.5455/jpma.295426
11. Nargesh, A., Ashok, T., Muhammad, S., & Mehra, A. (2013). Comparative study of the management of inter-trochanteric fractures in the elderly: Short proximal femoral nail vs dynamic hip screw. *Sri Lanka Journal of Surgery*, *30*(2), 13. https://doi.org/10.4038/sljs.v30i2.5176
12. Marmor, M., Liddle, K., Buckley, J., & Matityahu, A. (2016). Effect of Varus and valgus alignment on implant loading after proximal femur fracture fixation. *European Journal of Orthopaedic Surgery & Traumatology*, *26*(4), 379-383. https://doi.org/10.1007/s00590-016-1746-2
13. Lindskog, D. M., & Baumgaertner, M. R. (2004). Unstable Intertrochanteric hip fractures in the elderly. *Journal of the American Academy of Orthopaedic Surgeons*, *12*(3), 179-190. https://doi.org/10.5435/00124635-200405000-00006
14. Fang, C., Lau, T. W., Wong, T. M., Lee, H. L., & Leung, F. (2015). Sliding hip screw versus sliding helical blade for intertrochanteric fractures: a propensity score-matched case control study. *The Bone & Joint Journal*, *97-B*(3), 398-404. https://doi.org/10.1302/0301-620x.97b3.34791
15. Frei, H., Hotz, T., Cadosch, D., Rudin, M., & Käch, K. (2012). Central head perforation, or "Cut through," caused by the helical blade of the proximal femoral nail Antirotation. *Journal of Orthopaedic Trauma*, *26*(8), e102-e107. https://doi.org/10.1097/bot.0b013e31822c53c1
16. Goel, K., & K. Taneja, D. (2020). Proximal femoral nail V/S dynamic hip screw in treatment of intertrochanteric fracture femur. *Indian Journal of Orthopaedics Surgery*, *4*(3), 249-255. https://doi.org/10.18231/2395-1362.2018.0050
17. Khan, A. M., Anwar, S. F., Saif, A. B., Jaffary, A. U., & Rathore, M. O. (2023). Comparison of dynamic hip screw and proximal femoral nail in cases of unstable Intertrochanteric fractures of the femur, in terms of blood loss and operative time: Experience in a tertiary care hospital. *Pakistan Armed Forces Medical Journal*, *73*(3), 862-65. https://doi.org/10.51253/pafmj.v73i3.9019
18. Zhang, K., Zhang, S., Yang, J., Dong, W., Wang, S., Cheng, Y., ... & Yu, B. (2014). Proximal femoral nail vs. dynamic hip screw in treatment of intertrochanteric fractures: a meta-analysis. *Medical science monitor: international medical journal of experimental and clinical research*, *20*, 1628. https://pmc.ncbi.nlm.nih.gov/articles/PMC4170652/
19. Ashraf, R. A., Javed, A., Asghar, K., Amin, A., & Sheikh, S. I. (2021). Comparison of Dynamic Hip Screw and Proximal Femoral Nail in Intertrochanteric Femur Fractures. *Journal of Pakistan Orthopaedic Association*, *33*(03), 101-106. http://mail.jpoa.org.pk/index.php/upload/article/view/550
20. Wessels, J. O., Bjarnesen, M. P., Erichsen, J. L., Palm, H., Gundtoft, P. H., & Viberg, B. (2022). Sliding hip screw vs intramedullary nail for AO/OTA31A1-a3: A systematic review and meta-analysis. *Injury*, *53*(3), 1149-1159. https://doi.org/10.1016/j.injury.2021.12.034
21. Sharma, A., Sethi, A., & Sharma, S. (2018). Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: A comparative study. *Revista Brasileira de Ortopedia (English Edition)*, *53*(4), 477-481. https://doi.org/10.1016/j.rboe.2017.07.008
22. Saleem, M. T., Ali Shah, S. W., Shakoor, M. A., & Raza Khan, S. A. (2024). Comparison of the outcome of dynamic hip screw versus proximal femoral nail for treatment of intertrochanteric femoral fractures among elderly patients. *The Professional Medical Journal*, *31*(11), 1625-1630. https://doi.org/10.29309/tpmj/2024.31.11.8353