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Original Research Article

A Comparative Study between Dynamic Hip Screw and Proximal Femoral Nailing in the Management of Intertrochanteric Fractures of the Femur: A Hospital-Based Prospective Study

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Conflict of interest: Nil

Abstract:

Background: The incidence of hip fractures has been increasing due to higher life expectancy and a rising incidence of motor vehicle accidents. Approximately half of the hip fractures in the elderly are intertrochanteric fractures.

Aims and Objectives: The present study was done to evaluate and compare the clinical and radiological outcomes of patients treated by PFN and DHS for intertrochanteric fractures of the femur.

Methods and Materials: The present prospective study was conducted on 60 patients with stable intertrochanteric femur fractures attending out-patient departments at a tertiary centre. The institutional ethical committee granted ethical approval.

Results: In this study, the ratio of men to women was 2:1. We observed that low-velocity trauma, such as falls, caused frequent fractures, i.e., 86.67% of injuries were due to low velocity trauma and 13.33% were due to high velocity trauma, with the right side (66.67%) being the most common involvement.

Conclusion: We conclude that in stable intertrochanteric fractures, both the PFN and DHS have similar outcomes; however, the PFN has a better functional outcome with an unstable fracture.

Keywords: Femur, Intertrochanteric, Dynamic Hip Screw, Proximal Femoral Nailing

Introduction

The incidence of hip fractures has been increasing due to higher life expectancy and a rising incidence of motor vehicle accidents. Approximately half of the hip fractures in the elderly are intertrochanteric fractures [1, 2]. Intertrochanteric (IT) hip fractures most commonly occur among postmenopausal females and the elderly [3]. IT fractures in younger age groups are most frequently caused by high-energy trauma (RTA) [4]. Dynamic hip screws (DHS) and intramedullary nailing with proximal femoral nailing (PFN) are the two primary therapeutic methods that are frequently utilised to manage intertrochanteric fractures [5]. For stable intertrochanteric fractures, dynamic hip screw therapy is preferred; intramedullary nailing is mostly used for relatively unstable fractures [6].

Intertrochanteric (IT) hip fractures significantly burden the global healthcare system due to longer life expectancies and a higher frequency of RTA. PFN has become known as a common therapeutic option for unstable IT fractures, although not much study has been done to compare DHS with PFN in stable fractures [7].

Aims and Objectives

The present study was done to evaluate and compare the clinical and radiological outcomes of patients treated by PFN and DHS for intertrochanteric fractures of the femur.

Material and Methods

The present prospective study was conducted on 60 patients with stable intertrochanteric femur fractures

attending out-patient departments (OPD), Department of Orthopaedic, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India, and Department of Orthopaedic, Narayan Medical College & Hospital, Jamuhar, Rohtas, Sasaram, Bihar, India, that were operated on between June 2019 and May 2020. The patients were taken for evaluation of DHS vs. PFN after fulfilling the inclusion criteria.

On the basis of clinical notes and radiologic reports with clear evidence of an intact posteromedial coxa, the fracture's stability was determined. During the review phase, phone calls were made to the patients to learn more about their ambulation status and to get prospective information about long-term post-surgical performance.

Inclusion Criteria

a) Clinical diagnosis of a closed, stable trochanteric femur fracture and cases where critical clinical and radiologic documentation was present.
b) All patients Age ≥ 18 years old (skeletal maturity) at the time of injury with stable fractures, Time <2 weeks, and below 80 years

Exclusion Criteria

a) Age <18 years (skeletal immaturity) Time > 2 weeks and above 80 years
b) Open fractures, unstable fractures, compound fractures, and pathological fractures
c) Patient refusal
d) Polytrauma patients.
e) Cases where critical clinical and radiologic documentation was missing.

The patient's evaluation was done with x-rays and blood investigations.

Data including demographics, trauma room records, mode of injury, pre-operative orthopedic clinical notes, pre-operative radiologic images and reports, operative reports, intraoperative fluoroscopic interpretations, follow-up clinical notes, radiologic images, and reports were collected.

Data was collected and analysed using Microsoft Excel files and Statistical Package for Social Sciences (SPSS) version 23.0. For categorical variables, frequency measures were used to summarise the data, and mean and standard deviation (SD) were used for continuous variables. Paired T-tests were employed for parametric variables in the comparison between groups, while the Chi-square test was utilised for non-parametric variables. The ANOVA test was used to compare the variable mean values between the DHS and PFN groups. The institutional ethical committee granted ethical approval. P-values of <0.05 were regarded as significant. Clinical and radiological assessment of the patient was done, and comparison was done in terms of:

- Duration of surgery
- Total amount of blood loss (during surgery plus drain output)
- Timing of early mobilization and full weight bearing
- Radiological assessment for callus formation and bony union
- Harris hip score for clinical and radiological assessment

Results

The present study consists of 60 patients who had corrective surgery for stable intertrochanteric fractures. Out of these, 20 were treated with a proximal femoral nail (PFN) and 40 with a dynamic chip screw (DHS). The mean age of the present cohort studied was 62.5±12.82 years (mean±SD). The total number of male patients (n = 40) was double that of female patients (n = 20). 87.5% of patients were aged more than 50 years and 12.5% below 50 years in DHS, whereas 85% of patients were aged more than 50 years and 15% below 50 years in PFN. Right-side involvement was 57.5% in DHS and 55% in PFN, whereas left-side involvement was 42.5% in DHS and 45% in PFN, respectively (Table1,Figure1).

Table 1: Demographic parameters of patients

Demographic parameters	DHF group(n=40)	PFN group (n=20)
Gender		
Male	27	13
Female	13	07
Age in years		
40-50	05(12.5%)	03(15%)
51-60	10(25%)	06(30%)
61-70	19(47.5%)	07(35%)
>70	06(15%)	04(20%)
Side involvement		
Right	23(57.5%)	11(55%)
Left	17(42.5%)	09(45%)

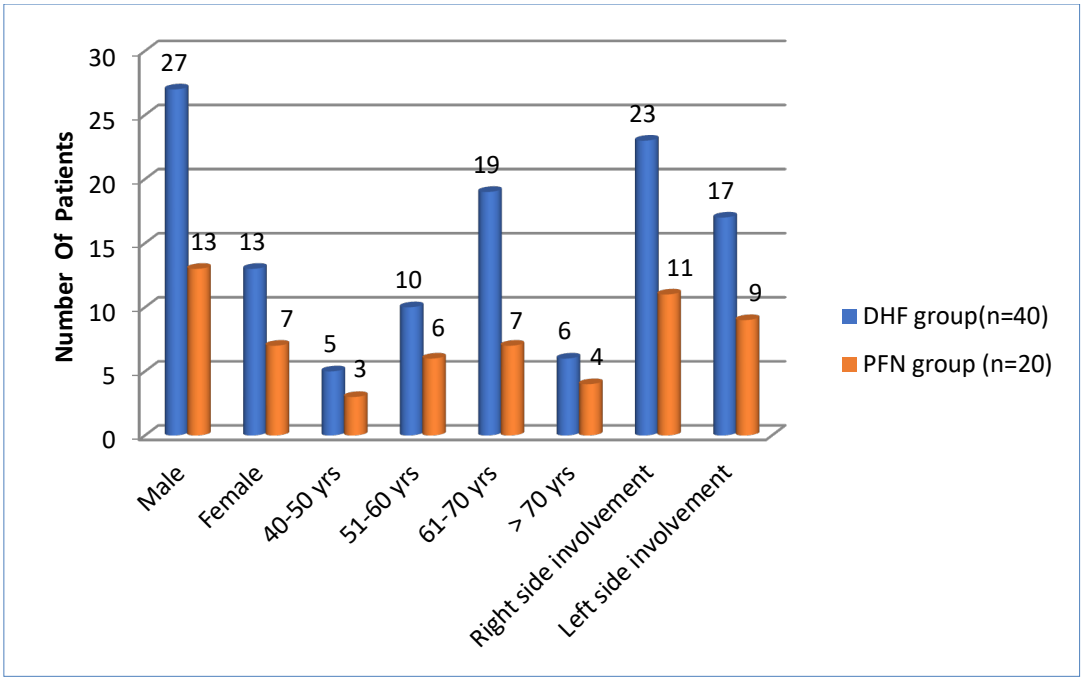

Figure 1: Demographic parameters of patients

DHS: Dynamic hip screw, PFN: Proximal femoral nail

Table 2: Mode of injury

Mode of injury	No. of patients (%)
Road traffic accident	3(5%)
Fall from height	2(3.33%)
Ground level fall	52(86.67%)
Tumor	1(1.67%)
Unknown	2(3.33%)

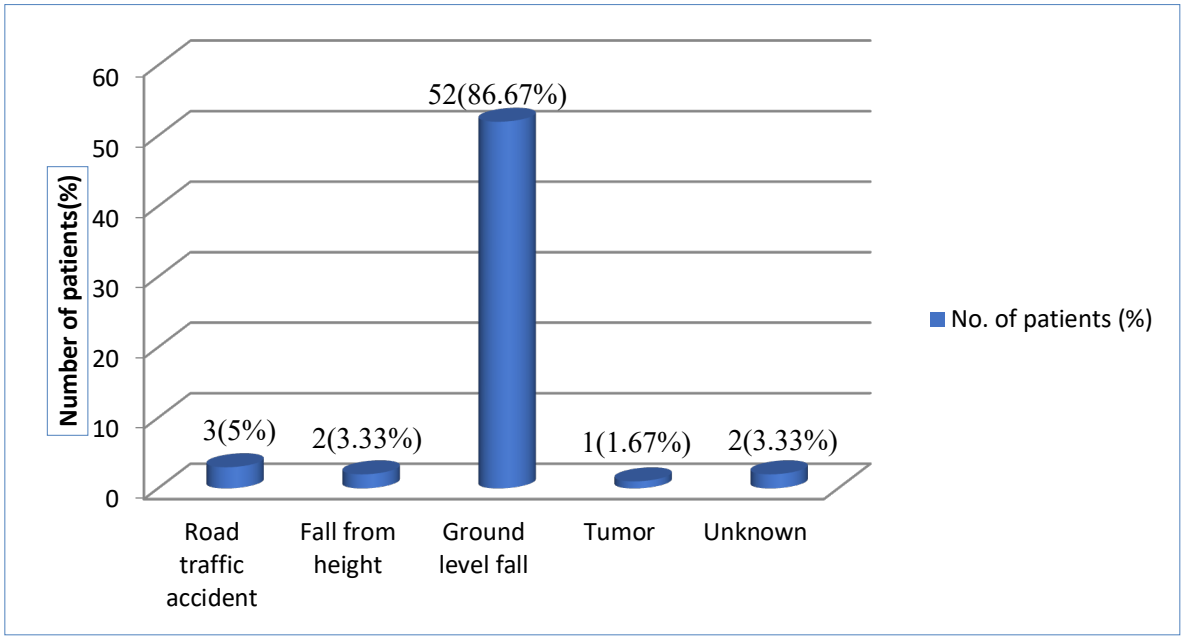

Figure 2: Mode of Injury

We observed that low-velocity trauma, such as falls, caused frequent fractures, i.e., 86.67% of injuries were due to low velocity trauma and 13.33% were due to high velocity trauma, with the right side (66.67%) being the most common involvement (Table 2 and Fig 2).

Table 3: Surgical parameters details of intertrochanteric fractures

Observation	DHS(n=40) (Mean ±SD)	PFN(n=20) (Mean ±SD)	P value
Mean duration of surgery (minutes)	66.92±12.43	62.52±8.67	0.001*
Mean time of surgery after fracture (days)	6.82±1.92	5.91±2.63	0.42
Mean intraoperative blood loss (ml)	178.61±18.21	168.50±20.94	0.002*
Mean duration of hospital stay (days)	9.43±1.89	8.71±1.93	0.20
Mean duration for full weight bearing (weeks)	12.82±2.65	9.82±3.50	0.002*
Mean Harris hip score	80.96±3.74	84.26±8.52	0.56

*p value= Significant

DHS had a little higher mean intraoperative blood loss (178.61 ml) than PFN (168.50 ml). Compared to DHS, the mean duration of surgery was less in PFN (62.52 min) than in DHS (66.92 min). In the PFN group, the surgery took less time overall, which was statistically significant ($p < 0.001$). The DHS group's average blood loss was slightly higher, and two patients needed blood transfusions after surgery. Although DHS recorded more blood loss, the DHS group had more instances requiring blood transfusions (Table 3).

The mean duration for full weight bearing in weeks in the DHS group and the PFN group was found to be 12.82 and 9.82 weeks, respectively. Significant results were obtained while comparing the mean time of full weight bearing between the DHS group and the PFN group (P value =0.002). No Significant results were obtained while comparing the Mean Harris hip score between the DHS group and the PFN group (P value = 0.56). A good functional outcome according to the Harris hip score occurred in the majority of patients in both groups (table 3).

Table 4: Functional Outcomes of the Harris Hip Score Compared Between DHS and PFN-Operated Groups

Functional outcome	DHS group(n=40)	PFN group(n=20)
Excellent	11	3
Good	26	15
Fair	3	1
Poor	0	1

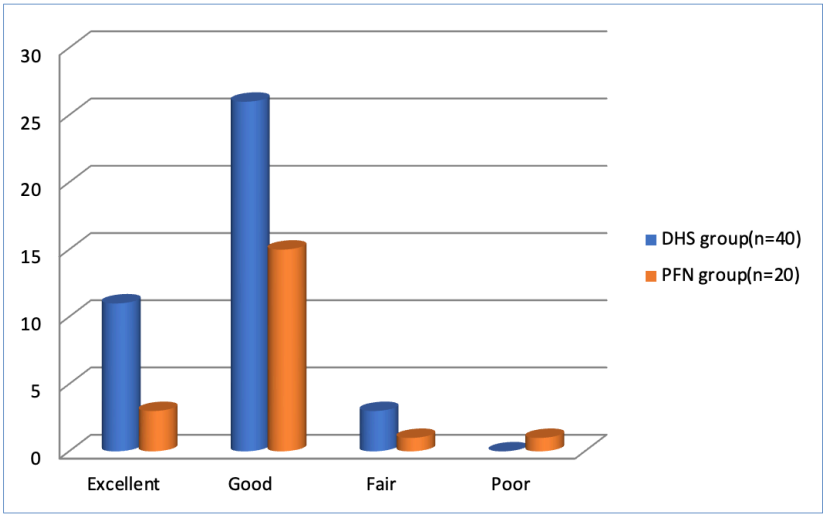

Figure 3: Functional outcomes of Harris hip score

In either group ,there was no post-operative mortality. All patients 'functional outcomes were evaluated and find out that better functional outcomes were observed after PFN, with a higher proportion of patients achieving ambulation (assisted and unassisted) compared to DHS, though this was not statistically significant (p-value>0.05)(Table 4,figure 3).

Table 5: Radiological Outcomes compared between DHS and PFN-operated groups

Radiological outcomes	DHS(n=40)	PFN(n=20)	P value
Non-union	09	05	0.40
Union	31	15	0.28

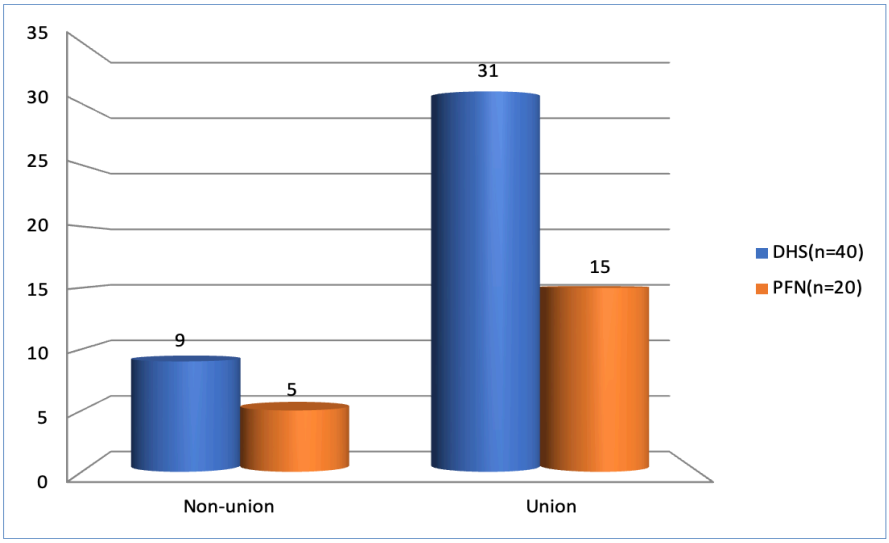

Figure 4: Radiological outcomes compared between DHS & PFN-operated groups

Radiological outcomes after PFN were better than DHS, with nearly a third more patients showing union on post-operative X-Rays, but the results were not statistically significant (p-value > 0.05) (Table 5, figure 4).

Discussion

In our study, the mean age of the patients was 62.50 years. Our study nearly correlates with Sharma and Sethi's study,[7] with an average age of 61.47 years. In this study, the ratio of men to women was 2:1. The difference in the current study is probably because the male-to-female ratio is measured only among operated fractures and not for the actual gender incidence for all trochanteric fractures.

The duration of surgery was longer in the DHS group by a mean of 4.40 minutes, which was statistically significant. Similar findings were noted by Saudanet al. [8], in 2002: the duration of surgery was lower in the PFN group with a mean difference of 1 minute.

Baumgartner et al.'s [9], findings were not in agreement with our study, as they reported in their series that surgical times were non-significantly higher in the DHF group.

We observed greater intraoperative blood loss during DHF (10.11 ml more) in comparison to the PNF procedure, which was significant (p = 0.001). This is similar to previous studies, where greater blood loss during DHS has been observed [9-15].

The overall functional outcome of patients treated with PFN was slightly better compared to DHS, which was non-significant (p > 0.470). However, when we compared the stable and unstable fractures separately, we found that the functional outcome of the unstable fracture treated with PFN was clinically better than that of the DHS group, with mean Harris hip scores of 80.96 and 84.26, respectively (p value = 0.56). The results were comparable to those of studies done by Giraud et al. and Karanam and colleagues [16,17]. However, Mavrogeniset et al.'s and Mereddy et al.'s findings were not in agreement with our study; they reported poorer functional results with PFN as compared to DHS [18,19].

Despite the difference in the proportion of patients with an observable union on radiographs, neither the PFN nor the DHS groups had any malunions. P. B. Das et al [20], have noted malunion present in some DHS cases.

Limitations of the study

Smaller sample size and a shorter follow-up period. A few differences between some variables were found, however, and with a large enough cohort, these differences might become significant. As such, further studies are needed over a longer period of time with a large enough sample to do a subgroup analysis.

Conclusion

We conclude that in stable intertrochanteric fractures, both the PFN and DHS have similar outcomes; however, the PFN has a better functional outcome with an unstable fracture. As the PFN requires a comparatively shorter operative time, significantly less blood loss, and a relatively shorter radiological union time, it has a distinct advantage over DHS even in stable intertrochanteric fractures. Hence, from our study, we have concluded that PFN is a better alternative fixation device than DHS in the treatment of intertrochanteric fracture.

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Reference

1. Leung K. Sub trochanteric fractures .In: Bucholz RW, Heckman JD, Court-Brown C, editors. Rockwood and Green's fractures in adults. 6th ed. Philadelphia, Lippincott: Williams &Wilkins;2006.p.1827–44.
2. Lavelle DG. Fractures and dislocations of the hip. In: Campbell WC, Canale ST, Beaty JH, editors. Campbell's operative orthopaedics. Philadelphia: Mosby; 2008. p.3237–308.
3. Hip fracture in adults: Epidemiology and medical management. (2020). Accessed: December 25,2022:https://www.uptodate.com/contents/hip-fracture-in-adults-epidemiology-and-medical management? Topic Ref=226 & source=see
4. Clement ND, Aitken S, Duckworth AD, McQueen MM, Court-Brown CM: Multiple fractures in the elderly. J Bone Joint Surg Br. 2012, 94:231-6. 10.1302/0301-620X.94B2.27381
5. Chughtai M, Khlopas A, Mont MA: Fixation methods in the management of hip fractures. Lancet. 2017, 389:1493-1494. 10.1016/S0140-6736(17)30551-2
6. Sonmez M M, Camur S, Erturer E, Ugurlar M, Kara A, Ozturk I: Strategies for proximal femoral nailing of unstable intertrochanteric fractures: lateral decubitus position or traction table. J Am Acad Orthop Surg. 2017, 25:e37-44. 10.5435/JAAOS-D-15-00691
7. Sharma A, Sethi A, Sharma S. Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: a comparative study. Rev Bras Ortop. 2017 Nov 8;53(4):477-81.
8. Saudan M, Lübbeke A, Sadowski C, Riand N, Stern R, HoR Meyer P. inter trochanteric fractures: is there an advantage to an intramedullary nail? A randomised, prospective study of 206 patients comparing the dynamic hip screw and proximal femoral nail J Orthop Trauma, 2002 Jul;16(6):386–93.
9. Baumgaertner MR, Curtin SL, Lindskog DM. Intramedullary versus extramedullary fixation for the treatment of intertrochanteric hip fractures. Clin Orthop Relat Res. 1998 Mar;(348):87-94.
10. Zou J, Xu Y, Yang H: A comparison of proximal femoral nail anti rotation anddynamic hip screw devices in trochanteric fractures. J Int Med Res. 2009, 37:1057-64.10.1177/147323000903700410
11. Klinger HM, Baums MH, Eckert M, Neugebauer R: A comparativestudy of unstable per- and intertrochanteric femoral fractures treated with dynamic hip screw (DHS) and trochanteric butt-press platevs. proximal femoral nail (PFN)[German].ZentralblChir.2005,130:301-6.10.1055/s-2005-836784
12. Xu YZ, Geng DC, Mao HQ, Zhu XS, Yang HL: A comparison of the proximal femoral nail anti rotation device and dynamic hip screw inthe treatment of unstable per trochanteric fracture. J Int Med Res. 2010, 38:1266- 75.10.1177 /147323 001003800408
13. Hesse B, Gächter A: Complications following the treatment oftrochanteric fractures with the gamma nail . Arch Orthop Trauma Surg.2004, 124:692-8. 10.1007 /s00402-004-0744-8
14. Zhao C, Liu DY, Guo JJ, Li LP, Zheng YF, Yang HB, et al. [Comparison of proximal femoral nail and dynamic hip screw for treating intertrochanteric fractures]. Zhongguo Gu Shang.2009Jul;22(7):535-7. [Article in Chinese].
15. Pan X-h, Xiao D-m, Lin B-w: Dynamic hip screws (DHS) and proximal femoral nails (PFN) in treatment of intertrochanteric fractures of femur in elderly patients. Chin J Orthop Trauma, 2004; 7: 785–89.
16. Giraud B, Dehoux E, Jovenin N, Madi K, Harisboure A, Usandizaga G, Segal P.[Pertrochanteric fractures: a randomized prospective study comparing dynamic screw plate and intramedullary fixation]. Rev Chir Orthop Reparatrice Appar Mot.2005Dec;91(8):732-6. [Article in French].
17. Karanam V, Kumar UA, Teja SP, Teja CV. PFN v/s DHS in stabilization of intertrochanteric fractures: A comparative study. Int J Orthop Sci. 2019;5(2):750-4.
18. Mavrogenis AF, Panagopoulos GN, Megaloikonomos PD, Igoumenou VG, Galanopoulos I, Vottis CT, et al. Complications After Hip Nailing for Fractures. Orthopedics. 2016Jan-Feb;39(1):e108-16.
19. Mereddy P, Kamath S, Ramakrishnan M, Malik H, Donnachie N. The AO/ASIF proximal femoral nail anti rotation (PFNA):a new design for the treatment of unstable proximal femoral fractures.Injury.2009 Apr;40(4):428-32.
20. Das PB, Singh A, Pani S: Osteo synthesis of intertrochanteric fractures by PFN and DHS - a prospective randomized comparative study. J Orthop Trauma Rehabil. 2020,10.1177/2210491720971832