OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Orthopaedics**

Functional Outcome Following Proximal Femur Fracture Fixation with DHS Vs. Trochanteric Plates

Dr. Md. Mustahizur Rahman[1*], Prof. Dr. Farid Ahmed[2], Dr. A. K. M. Khalequzzaman[3]

[1]Assistant Professor, Department of Orthopaedics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh
[2]Professor & Head, Department of Orthopaedics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh
[3]Associate Professor, Department of Orthopaedics, Universal Medical College, Dhaka, Bangladesh

DOI: https://doi.org/10.36348/sjmps.2025.v11i07.004 | **Received:** 18.05.2025 | **Accepted:** 25.06.2025 | **Published:** 01.07.2025

***Corresponding author:** Dr. Md. Mustahizur Rahman
Assistant Professor, Department of Orthopaedics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh

Abstract

Background: Proximal femur fractures, particularly intertrochanteric fractures, are common causes of morbidity among elderly patients. Surgical fixation using either a Dynamic Hip Screw (DHS) or a Trochanteric Plate (TP) is the standard of care, although evidence comparing their functional outcomes remains inconclusive. This study aimed to compare the clinical, radiological, and functional outcomes of proximal femur fracture fixation using DHS and TP. ***Methods:*** This comparative observational study was conducted at the Department of Orthopedics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh, from January 2023 to December 2024. A total of 30 patients were equally divided into the DHS (n=15) and TP (n=15) groups. Patient demographics, intraoperative variables, complications, radiological union, and functional outcomes were assessed. Harris Hip Score (HHS) was used to evaluate function at 6 months postoperatively. Data were analyzed using SPSS v25.0, and $p<0.05$ was considered statistically significant. ***Results:*** The mean operative time was significantly shorter in the TP group (58 ± 12 min) than in the DHS group (65 ± 15 min, $p<0.001$). Radiological union at 12 weeks was slightly higher in the TP group (86.6% vs. 73.3%, p=0.37). Mean HHS was comparable (TP: 90.2 ± 7.5 vs. DHS: 87.5 ± 8.2, p=0.35). The complication rates were low and not significantly different between the groups. ***Conclusion:*** Both DHS and TP fixation methods are effective in treating proximal femur fractures. TP fixation may offer minor advantages in terms of operative time and early union, but the functional outcomes at six months are similar.

Keywords: Dynamic hip screw, Trochanteric plate, Intertrochanteric fracture, Functional outcome.

INTRODUCTION

Proximal femur fractures, particularly intertrochanteric fractures, are common injuries, especially among the elderly population. Such fractures are usually accompanied by high levels of morbidity and mortality because patients with such fractures are highly aged and have comorbidities [1]. Surgical intervention is essential in the prevention of complications and in the recovery of functional autonomy when needed at the right time. The Dynamic hip screw (DHS) remains the gold standard for stable intertrochanteric fractures being one out of the several internal fixation devices [2]. Nevertheless, the biomechanical disadvantages of DHS, e.g. in case of poor lateral wall support and a possibility of varus collapse, can deteriorate outcomes due to the unstable configuration of the fractures [3,4].

In a bid to mitigate these drawbacks, implant concepts such as the Trochanteric Stabilization Plate (TSP) or even other trochanteric plate structures have been presented as complements or substitutes to DHS. The devices provide the lateral buttress support and the tendency to control fracture fragments, particularly with unstable AO fusion types (A2 and A3) [5,6]. A number of biomechanical and clinical trials have suggested that the trochanteric plates can be more resistant against the axial and torsional loads when compared to DHS alone [7,8]. Although these show theoretical and laboratory benefits, results in the clinical sphere are inconsistent and will vary on the basis of the fracture geometry, patient and also due to the surgery skills.

Recently, a comparison has been done between DHS and the other types of fixation tools, such as the Proximal Femoral Nail (PFN), the Locking Compression

Plate (LCP) and the pros and cons of the respective systems have been discussed [9,10]. Even though intramedullary implants such as PFN have benefits upon particular complex pyramidal fractures, they are technically challenging and expensive; therefore, constrained in the resource-starved environment [11]. Conversely, DHS with or without trochanteric augmentation has continued to be popular because it is comfortable, low cost, and its surgery is simpler [12].

An important outcome measure of an efficacy approach towards fixation of fractures is functional recovery. Harris Hip Score (HHS) is typically adopted in assessing postoperative hip functional evaluation with elements of pain, mobility, range of motion and activities of daily life included [13]. There have been conflicting findings as to whether trochanteric plates lead to improved functional scores than the DHS, and some have reported that trochanteric plates lead to better early mobility and union rates, whereas others have not shown any significant statistical improvement [14,15].

In Bangladesh, there are very few data comparing DHS with trochanteric plate fixation. This study was thus meant to compare the functional and radiological results of the two types of fixation methods used in fixing the proximal femur fractures in the tertiary hospital. This will assist the orthopedic surgeons, who work in a similar clinical setting, by offering practical guidelines to use when compared to intraoperative variables, postoperative complications, time to union, and after six months, Harris Hip Scores.

METHODOLOGY & MATERIALS

This comparative observational study was conducted at the Department of Orthopedics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh, from January 2023 to December 2024. A total of 30 patients with proximal femur fractures were enrolled and randomly assigned into two equal groups of 15 each: Group A underwent fixation using a Dynamic Hip Screw (DHS), and Group B received fixation with a Trochanteric Plate (TP).

Sample Selection

Inclusion Criteria:

- Adult patients aged between 40 and 80 years.
- Radiologically confirmed unstable intertrochanteric fractures (classified as AO types A1, A2, or A3).
- Patients fit for surgery under spinal or general anesthesia.
- Willingness to provide informed consent and comply with follow-up protocols.

Exclusion Criteria:

- Pathological fractures due to malignancy or metabolic bone disease.
- Polytrauma patients or those with multiple fractures.
- Patients with a previous history of ipsilateral hip surgery.
- Inability to provide informed consent or comply with follow-up.
- Severe systemic illness contraindicates surgery.

Data Collection Procedure:

Patient data were collected using a standardized form that included demographic details, comorbidities, mechanism of injury, fracture classification, operative findings, complications, and follow-up evaluations. Clinical assessment and radiographs were obtained preoperatively, postoperatively, and during follow-up visits at 6 weeks, 12 weeks, and 6 months. Functional outcome was measured using the Harris Hip Score (HHS). All surgeries were performed by senior orthopedic surgeons under sterile conditions. Informed consent was collected from all participants. Patient confidentiality was maintained throughout the study.

Statistical Analysis:

Data were analyzed using SPSS version 25.0. Descriptive statistics such as mean, standard deviation, and proportions were used to summarize the data. Continuous variables were compared using independent sample t-tests, while categorical variables were assessed using the chi-square test, where appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Demographic and clinical characteristics of the participants (n=30)

Category	Parameter	DHS Group (n = 15)	TP Group (n = 15)
Mean age (years)		59.2 ± 11.3	61.0 ± 10.8
Sex	Male	7 (46.7)	6 (40.0)
	Female	8 (53.3)	9 (60.0)
BMI	Normal	6 (40.0)	5 933.3)
	Overweight	6 (40.0)	7 946.7)
	Obese	3 (20.0)	3 (20.0)
Cause of fracture	Fall	12 (80.0)	11 (73.3)
	RTA	2 (13.3)	3 (20.0)
	Pathologic	1 (6.7)	1 (6.7)
Fracture type (AO)	Type A1	5 (33.30	4 (26.7)

	Type A2	7 (46.7)	8 (53.3)
	Type A3	3 (20.0)	3 (20.0)
ASA Score (mean ± SD)		2.1 ± 0.5	2.2 ± 0.6
Common comorbidities	Hypertension	8 (53.3)	7 (46.7)
	Diabetes mellitus	3 (20.0)	4 (26.7)
	Ischemic Heart Disease	2 (13.3)	1 (6.7)

Table 1 presents the demographic and clinical characteristics of the study population. The mean age was comparable between the DHS (59.2 ± 11.3 years) and TP (61.0 ± 10.8 years) groups. The gender distribution was similar, with a slight female predominance in both groups. BMI classifications showed a balanced distribution across normal, overweight, and obese categories. The most common cause of fracture was a fall, reported in 80% of DHS and 73.3% of TP patients. The AO fracture type distribution revealed A2 as the most prevalent type in both groups (46.7% DHS vs. 53.3% TP). The average ASA score was similar (2.1 ± 0.5 DHS vs. 2.2 ± 0.6 TP), and common comorbidities included hypertension, diabetes mellitus, and ischemic heart disease, without significant variation between groups.

Table 2: Intraoperative and Immediate Postoperative Parameters

Parameter	DHS Group (n = 15)	TP Group (n = 15)	p-value
Mean operative time (min)	65 ± 15	58 ± 12	<0.001
Mean blood loss (mL)	340 ± 90	300 ± 80	0.2
Intraoperative complications	1 (lag screw cut-out)	0	
Early wound infection	2 (13.3)	1 (6.7)	0.55

Table 2 describes the intraoperative and immediate postoperative parameters. The mean operative time was significantly longer in the DHS group (65 ± 15 minutes) compared to the TP group (58 ± 12 minutes, p<0.001). Mean intraoperative blood loss was higher in the DHS group (340 ± 90 mL) versus the TP group (300 ± 80 mL), although not statistically significant (p=0.2). One intraoperative complication (lag screw cut-out) was observed in the DHS group, while none were reported in the TP group. Early wound infection occurred in 2 cases (13.3%) in the DHS group and 1 case (6.7%) in the TP group (p=0.55).

Table 3: Radiological Union and Hospital Stay

Outcome	DHS Group	TP Group	p-value
Union by 12 weeks	11 (73.3)	13 (86.6)	0.37
Union by 24 weeks	15 (100%)	15 (100%)	
Mean hospital stay (days)	9.5 ± 2.3	8.7 ± 2.0	0.32

Table 3 illustrates the radiological union outcomes and hospital stay. At 12 weeks, radiological union was observed in 73.3% of DHS patients and 86.6% of TP patients (p=0.37). All patients in both groups achieved union by 24 weeks. The mean duration of hospital stay was marginally longer in the DHS group (9.5 ± 2.3 days) compared to the TP group (8.7 ± 2.0 days), but this difference was not statistically significant (p=0.32).

Table 4: Functional Outcome at 6 Months Based on Harris Hip Score

Outcome Category	DHS Group (n = 15)	TP Group (n = 15)	p-value
Excellent (≥ 90)	7 (46.6)	9 (60.0)	0.46
Good (80–89)	5 (33.3)	4 (26.7)	0.69
Fair (70–79)	2 (13.3)	1 (6.7)	0.55
Poor (< 70)	1 (6.7)	1 (6.7)	
Mean HHS score (± SD)	87.5 ± 8.2	90.2 ± 7.5	0.35

Table 4 presents the functional outcomes at six months postoperatively, based on the Harris Hip Score (HHS). An excellent outcome (HHS ≥ 90) was recorded in 46.6% of DHS patients and 60% of TP patients (p=0.46). The distribution of good, fair, and poor outcomes was comparable across both groups. The mean HHS was 87.5 ± 8.2 in the DHS group and 90.2 ± 7.5 in the TP group, with no statistically significant difference (p=0.35).

DISCUSSION

The functional and radiological outcome of Dynamic Hip Screw (DHS) and Trochanteric Plate (TP) in the treatment of proximal femur fracture has been compared in this study. The results showed no significant statistical differences in the overall functional outcome at six months but the TP group was trending better in Harris Hip Score (HHS), shorter duration of surgery and fewer complications. These findings are consistent and

contribute to the available literature concerning the treatment methods of intertrochanteric fractures.

The demographic features of the present research have been similar across the groups with an equal deployment of age, sex, BMI, type of fracture, and comorbidity. Such uniformity made the comparison of results across the two surgical procedures more reliable. The study by Fu *et al*. also reported similar baseline profiles, which facilitated a finer understanding of the effect of implant selection on outcome measures [10].

Regarding the intraoperative parameters, the operative time was significantly lower in the TP group than in DHS (58 and 65 minutes, respectively, $p<0.001$). The result is opposite to the longstanding premise that there can be an increased time requirement of TP fixation because plate contouring and positioning are more technical. Nevertheless, the newer sources, including Geetala *et al*., corroborate this fact by suggesting that as surgical comfort levels increase, TP fixation can be performed expeditiously with equal or less surgical time [16].

The extent of mean blood loss was greater in the DHS group, but the difference was not statistically significant. The results are similar to the results found by Kassem *et al*., who also found similar tendencies but on a statistically insignificant level in measuring average blood loss in DHS and augmented plating techniques [14]. The more blood loss with DHS can be explained, possibly by the sectioning of soft tissue taking longer.

The complication set of the present study leaned marginally towards TP fixation, and fewer iatrogenic errors inside and early outdoors basics. An intraoperative screw cut-out was only encountered in the DHS group. Even though the complication is well-documented in the literature, with careful surgical technique and patient selection, it could be minimized. Singh *et al*. confirmed the same incidence of hardware-related complications in work with DHS and reaffirmed the necessity of biomechanical stability in unstable fracture types [8].

The radiological union occurred in all patients at 24 weeks, and therefore, both fixation methods are effective in the end to allow fracture healing. The union at 12 weeks was, however, more prevalent in the TP group (but not statistically significant) (86.6% vs. 73.3%). Union in lateral plating constructs in unstable fractures has also been reported earlier, probably because of more control of medial comminution and lateral buttress reinforcement [6].

The result of the Harris Hip Score already showed that the functional outcome at six months revealed no statistically significant difference with the TP group having an improved mean outcome (90.2 vs. 87.5). This is similar to the findings of Memon *et al*., who recorded slightly improved HHS in the TP group but this is insignificant [17]. On the other hand, Jonnes *et al*. showed superior results of intramedullary fixation over DHS, adding to the role of fracture configuration and implant biomechanics of functional recovery [18].

Though it has been shown that some studies prefer intramedullary nail use to treat unstable intertrochanteric fractures, DHS with trochanteric or lateral wall augmentation has not become obsolete. Both Fu *et al*. and Dhamangaonkar *et al*. proposed that lateral plating systems could show similar results with intramedullary devices that are more expensive or challenging to manipulate when applied properly [10,19].

Another key factor is the economic and logistical viability of the implant choice. The DHS is still commonly used in low-resource countries such as Bangladesh, where cost and the expired inventory of implants are the key issues. The trochanteric plate can enhance mechanical stability without imposing a significant increment in the financial load, which in a local sense is observed by Hakim *et al*. [12].

Although it is quite possible with both DHS and TP, we have found that trochanteric plating holds some benefits of relatively short operative time, early union, and reduced complications, even though these benefits are quite marginal. Nevertheless, the insignificance of most parameters serves as a consideration that substantiates further research in order to confirm these trends. The small sample size, limited follow-up, single center design limits the generalizability of this study. Also, other conditions such as the early experience of the surgeon, compliance with rehabilitation, and availability of surgeons may affect the results as well and should be looked into further.

Multicenter, long-term follow-up, and cost-effectiveness and cost-benefit evaluations in future studies may enable a better selection strategy for implants. However, this research can bring helpful initial data proving the functional equalities and possible benefits of using trochanteric plates instead of DHS to treat proximal femur fractures.

CONCLUSION

This comparative study demonstrates that both Dynamic Hip Screw (DHS) and Trochanteric Plate (TP) fixation methods are effective for the surgical management of proximal femur fractures, with no statistically significant differences in functional outcomes at six months. However, the TP group showed a trend toward better operative efficiency, fewer complications, and earlier radiological union. These findings suggest that TP fixation may offer modest advantages, particularly in unstable fracture patterns, although both techniques remain viable depending on the clinical context and surgeon expertise.

Acknowledgment

I would like to express my sincere gratitude for the invaluable support and cooperation provided by the staff, participants, and my co-authors/colleagues who contributed to this study.

Conflicts of interest: There are no conflicts of interest.

REFERENCES

1. López-Hualda A, Arruti-Pérez E, Bebea-Zamorano FN, Sosa-Reina MD, Villafañe JH, Martínez-Martin J. Morbidity and mortality analysis in the treatment of intertrochanteric hip fracture with two fixation systems: dynamic hip screw (DHS) or trochanteric fixation nail advance (TFNA). Geriatrics. 2023 Jun 8;8(3):66.
2. Prakash AK, Shanthappa AH, Venkataraman S, Kamath A. A comparative study of functional outcome following dynamic hip screw and proximal femoral nailing for intertrochanteric fractures of the femur. Cureus. 2022 Apr 4;14(4).
3. Zamal AH, Ferdoushi Begum MM. Comparison of Functional Outcome Like Range of Motion of Hip After Fixation of Trochanteric Fracture with Dynamic Hip Screw (DHS) and Proximal Femoral Locking Compression Plate (PF-LCP). Sch J App Med Sci. 2022 Aug; 8:1252-5.
4. Arif A, Bhatti HW, Chaudhary NA, Sadiq A. Comparison between the outcome of proximal femoral locking compression plate and dynamic hip screw in intertrochanteric femoral fractures. International Surgery Journal. 2021 Sep 28;8(10):2880-4.
5. Madsen JE, Næss L, Aune AK, Alho A, Ekeland A, Strømsøe K. Dynamic hip screw with trochanteric stabilizing plate in the treatment of unstable proximal femoral fractures: a comparative study with the Gamma nail and compression hip screw. Journal of orthopaedic trauma. 1998 May 1;12(4):241-8.
6. Babst R, Renner N, Biedermann M, Rosso R, Heberer M, Harder F, Regazzoni P. Clinical results using the trochanter stabilizing plate (TSP): the modular extension of the dynamic hip screw (DHS) for internal fixation of selected unstable intertrochanteric fractures. Journal of orthopaedic trauma. 1998 Aug 1;12(6):392-9.
7. Garg B, Marimuthu K, Kumar V, Malhotra R, Kotwal PP. Retracted: Outcome of Short Proximal Femoral Nail Antirotation and Dynamic Hip Screw for Fixation of Unstable Trochanteric Fractures. A Randomised Prospective Comparative Trial. Hip international. 2011 Sep;21(5):531-6.
8. Singh G, Gautam S, Ahmed N, Garg C, Kumar S. Evaluation of various methods of trochanteric fracture fixation and their comparison-a prospective study. J Evol Med Dent Sci. 2019 Apr 29;8(17):1388-94.
9. Mehta A, Verma RK. Comparing the outcomes of intertrochanteric fractures treated with DHS vs PFLCP.
10. Fu CW, Chen JY, Liu YC, Liao KW, Lu YC. Dynamic hip screw with trochanter-stabilizing plate compared with proximal femoral nail antirotation as a treatment for unstable AO/OTA 31-A2 and 31-A3 intertrochanteric fractures. BioMed Research International. 2020;2020(1):1896935.
11. Shivanna UM, Rudrappa GH. A comparative study of functional outcome between dynamic hip screw and proximal femoral nail in surgical management of per-trochanteric fractures. Journal of Evolution of Medical and Dental Sciences. 2015 May 28;4(43):7489-99.
12. Hakim J, Jahan A, Khan MR, Reza MH, Al Zilani R, Shahiduzzaman M, Choudhury MQ. Evaluation of Outcome of Treatment of Intertrochanteric Fracture with Dynamic Hip Screw (DHS). Ibrahim Cardiac Medical Journal. 2019;9(1-2):36-41.
13. Khanra AK, Sardar I, Sarkar TN, Chatterjee R. Comparative Assessment of Functional Recovery Following Dynamic Hip Screw Plate versus Proximal Femoral Nail Fixation in the Management of Unstable Trochanteric Fractures of the Femur. Journal of Orthopaedics, Traumatology and Rehabilitation. 2024 Jul 1;16(2):153-7.
14. Kassem E, Younan R, Abaskhron M, Abo-Elsoud M. Functional and radiological outcomes of dynamic hip screw with trochanteric stabilizing plate versus short proximal femoral nail in management of unstable trochanteric fractures: A randomized-controlled trial. Joint diseases and related surgery. 2022 Oct 21;33(3):531.
15. Guerra MT, Pasqualin S, Souza MP, Lenz R. Functional recovery of elderly patients with surgically-treated intertrochanteric fractures: preliminary results of a randomised trial comparing the dynamic hip screw and proximal femoral nail techniques. Injury. 2014 Nov 1;45:S26-31.
16. Geetala R, Wakefield E, Bradshaw F, Zhang J, Krkovic M. Comparison of intra-operative outcomes following internal fixation with trochanteric stabilisation plate or intramedullary nail in intertrochanteric fractures. European Journal of Orthopaedic Surgery & Traumatology. 2024 Feb;34(2):1193-9.
17. Memon K, Siddiqui AM, Khan ZA, Zahoor AW. Dynamic hip screw fixation vs. proximal femur nail for unstable per-trochanteric fractures: a comparative analysis of outcomes and complications. Journal of Ayub Medical College Abbottabad. 2021 Feb 20;33(1):34-8.
18. Jonnes C, Shishir SM, Najimudeen S. Type II intertrochanteric fractures: proximal femoral nailing (PFN) versus dynamic hip screw (DHS). Archives of Bone and Joint Surgery. 2016 Jan;4(1):23.
19. Dhamangaonkar AC, Joshi D, Goregaonkar AB, Tawari AA. Proximal femoral locking plate versus dynamic hip screw for unstable intertrochanteric femoral fractures. Journal of Orthopaedic Surgery. 2013 Dec;21(3):317-22.