

Outcome Assessment in Intertrochanteric Fractures Management with Dynamic Hip Screw and Proximal Femoral Nailing: Comparative Analysis**Saurabh Kumar**

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Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to compare the functional outcome of dynamic hip screw and proximal femoral nailing in the treatment of intertrochanteric fractures.**Methods:** The present study was conducted in the Department of Orthopaedics, for the period of 24 months and all patients with type I, type II or type III intertrochanteric fractures undergoing PFNA2 or DHS fixation. A total of 200 patients were taken and patients were divided to two groups of 100 each for DHS and PFNA2.**Results:** There was no significant difference in gender distribution, mode of injury and Boyd and Griffin classification distribution between the two groups. The mean six weeks score in Group DHS was 33.47 ± 3.20 and in Group PFN was 34.36 ± 2.7 . There was not much significant difference in the mean six weeks comparison between the two groups. The mean 12 weeks score in Group DHS was 53.67 ± 2.68 and in Group PFN was 63.19 ± 5.95 . There was a significant difference in the mean 12 weeks comparison between the two groups. The mean 24 weeks score in Group DHS was 82.5 ± 7.63 and in Group PFN was 88.22 ± 6.54 . There was a significant difference in the mean 24 weeks comparison between the two groups. In Group DHS, results were excellent in 34%, good in 42%, fair in 18% and poor in 6%. In Group PFN, results were excellent in 56%, good in 34% and fair in 10%. There was not much significant difference in results distribution between the two groups.**Conclusion:** From the study based on the functional outcome derived from Harris Hip Score, it can be concluded that PFN had a better outcome in intertrochanteric fractures compared to DHS fixation. This was concluded based on the final outcome, range of movements, and HHS. The highest percentage of subjects in the PFN group had excellent to a good outcome and none of them had poor outcomes when compared to the DHS group.**Keywords:** Intertrochanteric fracture, Dynamic hip screw, proximal femoral nail anti-rotationThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Around half of all hip fractures are intertrochanteric (IT) femur fractures. Intertrochanteric fractures are most frequently caused by a low-energy mechanism, such as a fall from standing height. Hip fractures are associated with increasing age, feminine gender, osteoporosis, a history of falls, and aberrant gait. [1,2] The incidence of intertrochanteric femoral fractures has increased dramatically over the last few decades and is likely to continue in the near future as the elderly population increases and the prevalence of osteoporosis increases. Intertrochanteric fractures occur at varying rates in different countries. [2] Intertrochanteric fractures are becoming more common as the number of senior individuals diagnosed with osteoporosis increases. By 2040, it is anticipated that the incidence will have doubled. Numerous studies have been conducted on the treatment of intertrochanteric fractures. Numerous study modes have been used to investigate surgical and nonsurgical therapies.

The studies have been conducted comparing the outcome of intertrochanteric fractures treated with a dynamic hip screw against a proximal femur nail. The goal of treatment for these fractures is stable stabilisation, which enables the patient to be mobilized faster. These fractures have a high rate of morbidity and mortality. Co-morbid medical issues such as diabetes, hypertension, pulmonary, renal, and cardiac diseases all contribute to the fracture's insult. Elderly individuals are at risk of developing potentially fatal consequences such as hypostatic pneumonia, catheter-associated sepsis, cardiopulmonary failure, and decubitus ulcer. [3]

Intramedullary nails such as PFN, are more stable under the action of a shorter lever arm, so the distance of the nail from the hip joint is reduced compared with that for a plate, thereby reducing the deformation forces across the implant. The biomechanical advantage of intramedullary devices is important particularly in unstable trochanteric and

sub trochanteric fractures. [4,5] The best part of DHS is its sliding effect which allows fracture site compression and minimizing the dangers of screw cut out and migration associated with non-sliding devices. Early rehabilitation of the patient and prevention of medical complications like thromboembolism, decubitus ulcer by early mobilization. [6]

Mortality rates in intertrochanteric fractures is comparatively high among elderly (>30% in the first year) IT fractures were previously managed by conservative methods which included traction, bed rest for 12-15 weeks followed by lengthy programme of ambulation and gait training which lead to high mortality rates and complications like bedsores, aspiration pneumonia, urinary tract infections, joint contractures, thromboembolic complications and shortening. [7-9] Proximal femoral nail anti-rotation (PFNA) was introduced by AO in 2003 in which screws were replaced by a helical blade. Helical blade impacts the cancellous bone around it when it is driven in which increases the femoral head strength as well as stability of fixation. It can be inserted without reaming out bone from head and neck region thereby giving more anchorage especially in osteoporotic fractures. PFNA2 was introduced for Asian population who has comparatively smaller femur. [10,11]

The aim of the present study was to compare the functional outcome of dynamic hip screw and proximal femoral nailing in the treatment of intertrochanteric fractures.

Materials and Methods

The present study was conducted in the Department of Orthopaedics, Netaji Subhas Medical College and Hospital, Amhara, Bihta, Patna, India for the period of 24 months and all patients with type I, type II or type III intertrochanteric fractures undergoing PFNA2 or DHS fixation. A total of 200 patients were taken and patients were divided to two groups of 100 each for DHS and PFNA2.

Study Procedure

After obtaining informed written consent, patients with type I, type II and type III intertrochanteric

fractures (Boyd and Griffin classification) who were independent ambulators before the injury were enrolled in the study. 16 Those patients with arthritis of the hip, other joint pathologies of the hip, pathological fractures and other fractures of the same limb were excluded. Sociodemographic and clinical data including age, gender, type of fracture and pre injury ambulatory status was collected on a pretested and structured proforma. Implant selection for the surgery was done based on the operating surgeon's decision. Patient was positioned on the fracture table and traction was applied, fracture reduction confirmed under image intensifier following which DHS or PFNA 2 standard procedures were performed. If satisfactory reduction was not obtained for the PFNA 2 procedure by closed means, mini open technique was used for obtaining reduction and proceeded with nailing.

All the patients underwent standard rehabilitation protocol. They were started mobilization on 2nd post-operative day with quadriceps strengthening exercise, knee and ankle mobilization. Drains were removed after 24 hours. Wound inspection was done on 3rd postoperative day. Stitches were removed after 10th postoperative day. Postoperative follow-up was done at 1 month, 3 months, 6 months following surgery and scores evaluated by Harris hip score (HHS). 17 Radiographs of fracture were taken at the end of 3 months and 6 months to assess whether union has occurred.

Statistical Analysis

The results were entered in MS excel version 3.4.1 and analysed using SPSS version 20. Quantitative variables were summarized as mean and standard deviation whereas qualitative variables were expressed as percentages and proportions. Using Harris hip score the functional outcome has been classified as excellent (90-100), good (80-89), fair (70-79) and poor (<70). Quantitative variables were compared using unpaired Student's t test/Mann Whitney U test. The qualitative variables were compared with Chi square test/Fisher's exact test. P value < 0.05 was considered to be significant.

Results

Table 1: Sociodemographic data

Characteristics	DHS group	PFN group
Mean (SD) age	64.06	61.01
Gender		
Male	40 (40%)	45 (45%)
Female	60 (60%)	55 (55%)
Side		
Left	54 (54%)	42 (42%)
Right	46 (46%)	58 (58%)
Mode of injury		
RTA	5 (5%)	26 (26%)
Self-fall	20 (20%)	74 (74%)

others	75 (75%)	0
Boyd and Griffin classification		
Type-1	30 (30%)	40 (40%)
Type-2	55 (55%)	34 (34%)
Type-3	8 (8%)	22 (22%)
Type-4	7 (7%)	4 (4%)

There was no significant difference in gender distribution, mode of injury and Boyd and Griffin classification distribution between the two groups.

Table 2: Mean score comparison between the DHS and PFN group at the six, 12 and 24-week follow up

	Group				P-value
	DHS		PFN		
	Mean	SD	Mean	SD	
6 weeks	33.47	3.20	34.36	2.7	0.925
12 weeks	53.67	2.68	63.19	5.95	< 0.001
24 weeks	82.5	7.63	88.22	6.54	0.022

The mean six weeks score in Group DHS was 33.47 \pm 3.20 and in Group PFN was 34.36 \pm 2.7. There was not much significant difference in the mean six weeks comparison between the two groups. The mean 12 weeks score in Group DHS was 53.67 \pm 2.68 and in Group PFN was 63.19 \pm 5.95. There was

a significant difference in the mean 12 weeks comparison between the two groups. The mean 24 weeks score in Group DHS was 82.5 \pm 7.63 and in Group PFN was 88.22 \pm 6.54. There was a significant difference in the mean 24 weeks comparison between the two groups.

Table 3: Functional outcome distribution between DHS and PFN groups

Result		Group			
		DHS		PFN	
	Excellent	34	34	56	56
	Good	42	42	34	34
	Fair	18	18	10	10
	Poor	6	6	0	0

In Group DHS, results were excellent in 34%, good in 42%, fair in 18% and poor in 6%. In Group PFN, results were excellent in 56%, good in 34% and fair in 10%. There was not much significant difference in results distribution between the two groups.

Discussion

Intertrochanteric fractures are predominately associated with trivial trauma among the geriatric patients. It is commonly encountered in orthopaedic surgeon day to day daily practices. Intertrochanteric fractures treated without surgical interventions, can result in malunion with coxa vara deformity, shortening of the limb, limping, bedsores and other secondary complications. [12] Earlier conservative treatment was given which usually delayed the active mobilization of the patient for about 4 weeks which lead to multiple secondary complications. Intertrochanteric fractures are common in elderly patients, mainly due to trivial trauma. The percentage of intertrochanteric fractures differs from country to country. Increased incidence of varus deformity and also shortening leads to poor function. Surgical management of intertrochanteric fractures was introduced to improve functional outcomes and reduce complications from prolonged bed rest. [13,14] Fractures of the intertrochanteric region of

the femur have been recognized as a major challenge by the Orthopedic community, not just only for achieving fractures union, but for also restoration of optimal function in the least short possible time with very minimal complications. The aim of fracture management accordingly has drifted to achieving very early mobilization, rapid rehabilitation, and quick return of the individuals to pre-morbid home and work-like environment as a functionally and psychologically independent unit.

There was no significant difference in gender distribution, mode of injury and Boyd and Griffin classification distribution between the two groups. In a study of 40 patients conducted by Bakshi AS et al [15], the mean age in the DHS group was 60.3, and that in the PFN group was 56.85. In another study of 52 patients conducted by Parikh KN et al [16], the mean age in the DHS group was 65, and that in the PFN group was 70.2. Young patients with intertrochanteric or sub-trochanteric fractures have suffered trauma as a result of a traffic accident or a fall from a height, reflecting the need for high-velocity trauma to cause fractures in young people.. In his study of 30 cases, Mundla et al [17] described 70% of cases as a result of trivial falls while 23% was due to RTA. Jonnes et al [18] conducted a study

on 30 cases where they described 77% of cases as a result of trivial falls while the remaining 23% was due to RTA.

The mean six weeks score in Group DHS was 33.47 ± 3.20 and in Group PFN was 34.36 ± 2.7 . There was not much significant difference in the mean six weeks comparison between the two groups. The mean 12 weeks score in Group DHS was 53.67 ± 2.68 and in Group PFN was 63.19 ± 5.95 . There was a significant difference in the mean 12 weeks comparison between the two groups. The mean 24 weeks score in Group DHS was 82.5 ± 7.63 and in Group PFN was 88.22 ± 6.54 . There was a significant difference in the mean 24 weeks comparison between the two groups. In a study of 40 patients conducted by Bakshi AS et al¹⁵, the mean HHS in the DHS group was 83.75, and that in the PFN group was 84.4. In his study of 80 cases, Shakeel et al [19] found that the mean HHS in the DHS group was 73.73 while in the PFN group, it was 83.5. In a study of 60 patients conducted by Sharma et al [20], the mean HHS in the DHS group was 88.7, and that in the PFN group was 82.2.

In Group DHS, results were excellent in 34%, good in 42%, fair in 18% and poor in 6%. In Group PFN, results were excellent in 56%, good in 34% and fair in 10%. There was not much significant difference in results distribution between the two groups. Gill et al [21], in his comparative study of 80 patients using the Locking DHS and PFN, noted that in the DHS group, excellent results were seen in six (15%), good results seen in 14 (35.0%), fair results seen in 12 (30.0%), and poor results seen in eight (20.0%). In the PFN group, excellent results were seen in eight (20.0%), good results seen in 130 (75.0%), fair results seen in two (5.0%), and no poor results were seen.

Conclusion

From the study based on the functional outcome derived from Harris Hip Score, it can be concluded that PFN had a better outcome in intertrochanteric fractures compared to DHS fixation. This was concluded based on the final outcome, range of movements, and HHS. The highest percentage of subjects in the PFN group had excellent to a good outcome and none of them had poor outcomes when compared to the DHS group. PFN group had higher scores of HHS at 12 weeks, 24 weeks and at the end of follow-up. PFN has a faster recovery and better functional outcome in all types of intertrochanteric fracture with fewer complications.

References

1. Grisso JA, Kelsey JL, Strom BL, Ghiu GY, Maislin G, O'Brien LA, Hoffman S, Kaplan F. Risk factors for falls as a cause of hip fracture in women. *New England journal of medicine*. 1991 May 9;324(19):1326-31.

2. Qidwai SA, Singh R, Mishra AN, Trivedi V, Khan AA, Kushwaha SS, Kumar V. Comparative study of functional outcome of the intertrochanteric fracture of femur managed by Dynamic hip screw and proximal femoral nail. *National Journal of Clinical Orthopaedics*. 2019;3(1):26-30.
3. Kulkarni GS, Limaye R, Kulkarni M, Kulkarni S. Intertrochanteric fractures. *Indian J Orthop*. 2006 Jan 1;40(1):16-23.
4. Schumpelick W, Jantzen PM. A new principle in the operative treatment of trochanteric fractures of the femur. *JBJS*. 1955 Jul 1;37(4):693-8.
5. Massie WK. Fractures of the Hip. *J Bone Joint Surg*. 1964;46(3):658–90.
6. Sermon A, Broos PLO. The use of PFNA in treatment of intertrochanteric fractures. *Folia Traumatol*. 2007;p. 48–52.
7. Jiang HX, Majumdar SR, Dick DA, Moreau M, Raso J, Otto DD, et al. Development and initial validation of a risk score for predicting in-hospital and 1-year mortality in patients with hip fractures. *J Bone Min Res*. 2005; 20(3):494-500.
8. Ngobeni RS. Mortality in elderly patients with intertrochanteric fractures: three years' experience. *SA Orthop J*. 2010;9(1):55-60.
9. Choudhari P, Chhabra S, Kiyawat V. Evaluation of results of titanium elastic nailing system in paediatric lower extremity fractures of long bones. *J Evol Medic Dent Sci*. 2014; 3(72):15303-10.
10. Raviraj A, Anand A, Chakravarthy M, Pai S. Proximal femoral nail antirotation (PFNA) for treatment of osteoporotic proximal femoral fractures. *Eur J Orthop Surg Traumatol*. 2012; 22:301-5.
11. Santharam B, Mohammed KF, Ratnam S, Madhav A. A comparative study of intertrochanteric fractures of hip treated with PFN & PFNA 2.
12. Falch JA, Ilebekk A, Slungaard U. Epidemiology of hip fractures in Norway. *Acta Orthop Scand*. 1985;56(1):12–6.
13. Hagino H, Furukawa K, Fujiwara S. Recent trends in incidents and lifetime risk of hip fracture in Tottori. *Japan Osteoporos Int*. 2009;20(4):543–8.
14. Jarnlo GB, Thorngren KG. Background Factors to Hip Fractures. *Clin Orthop and Relat Res*. 1993;&NA;(287):41–9.
15. Bakshi AS, Kumar P, Brar BS. Comparative study between DHS and PFN in intertrochanteric fractures of femur. *Int J Orthop Sci*. 2018;4(1d):259-62.
16. Parikh KN, Parmar C, Patel M, Shah SB. Functional and radiological outcome of proximal femoral nailing versus dynamic hip

- screw in unstable intertrochanteric femur fractures. *Int J Res Orthop*. 2018 Nov;4(6): 861.
17. Mundla MKR, Shaik MR, Buchupalli SR, et al: A prospective comparative study between proximal femoral nail and dynamic hip screw treatment in trochanteric fractures of femur. *Int J Res Orthop*. 2018, 4:58-64.
 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. Qidwai SA, Singh R, Mishra AN, Trivedi V, Khan AA, Kushwaha SS, Kumar V. Comparative study of functional outcome of the intertrochanteric fracture of femur managed by Dynamic hip screw and proximal femoral nail. *National Journal of Clinical Orthopaedics*. 2019;3(1):26-30.
 20. 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. *Revista brasileira de ortopedia*. 2018 Jul;53:477-81.
 21. Gill SP, Mittal A, Raj M, Singh P, Kumar S, Kumar D. Dynamic hip screw with locked plate VRS Proximal Femoral Nail for the management of intertrochanteric fracture: A comparative study. *Int J Orthop Sci*. 2017;3(2):173-80.