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Comparison of Proximal femoral nail versus Dynamic Hip Screw for treatment of Intertrochanteric fractures

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Abstract
***Background*: *Material and Methods**: The present study was a prospective randomized study consisted of 60 adult patients with fresh intertrochanteric fractures of femur that were treated with Proximal Femoral Nail (PFN) or Dynamic Hip Screw (DHS) at ASRAM Medical college, Eluru, West Godavari district, Andhra Pradesh between October 2020 and October 2022.*
This study was carried out to compare the results of inter-trochanteric fractures treated with DHS and PFN. All the 60 patients were followed up at regular intervals.
***Results:** Functional results based on Harris hip score were better with PFN. There were more excellent/good results with PFN (93%) as compared to DHS (78%). There was one poor result with DHS and none with PFN.*
***Conclusion:** Overall, we believe that with experience, operative time and radiation exposure can be reduced in case of PFN. Thus we conclude that PFN is a better alternative to DHS in the management of inter-trochanteric fractures in terms of short term functional results but is a technically more demanding procedure and requires more expertise as compared to DHS.*

***Keywords:** Dynamic Hip screw [DHS], Harris hip score, Intertrochanteric fracture, Proximal femoral nail [PFN].*

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I. Introduction

Inter-trochanteric fractures of the femur are one of the most common fractures of the hip in the elderly[1]. They occur usually due to low energy trauma like simple falls. The problems associated with these fractures are significant mortality and morbidity, mal-union, and implant failure thus constituting a great financial burden on the family.

The Dynamic hip screw (DHS) system has become a widely used method of internal fixation and remains the gold standard against which other fixation devices need to be compared [2].

Proximal femoral nail (PFN) is a cephalomedullary nail, which has two screws in the neck and two interlocking screws in the femoral shaft. However, patients treated with these devices are at increased risk for femoral shaft fracture at the nail tip and the insertion sites of the distal locking screws [3],[4].

II. Materials And Methods:

All patients with fresh inter-trochanteric fracture femur, Age - Patients above age of 18 years, Sex – Both males & females were included.

Dynamic hip screw**,** Length of Richard's screw is measured from tip of the head to the base of greater trochanter on AP view.

Length of side plate Length of the side plate is determined to allow purchase of at least 6 to 8 cortices on the shaft distal to the fracture [11].

Proximal femoral nail, nail diameter was determined by measuring diameter of the femur at the level of isthmus on an AP X ray [11]. A standard length PFN (250mm) was used in most of our cases.

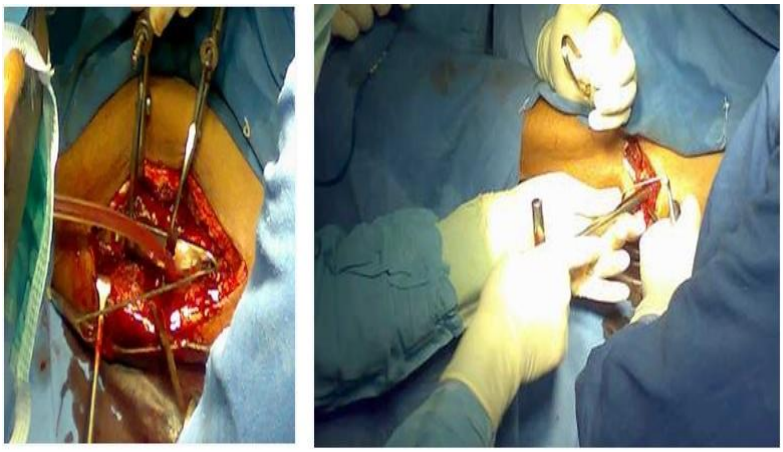


Fig 1: Intra operative pictures of DHS

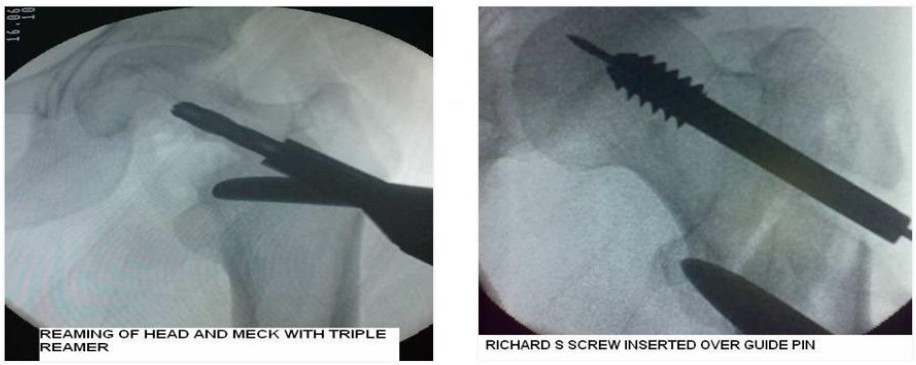


Fig 2: Intra operative c-arm and postoperative x-rays of DHS

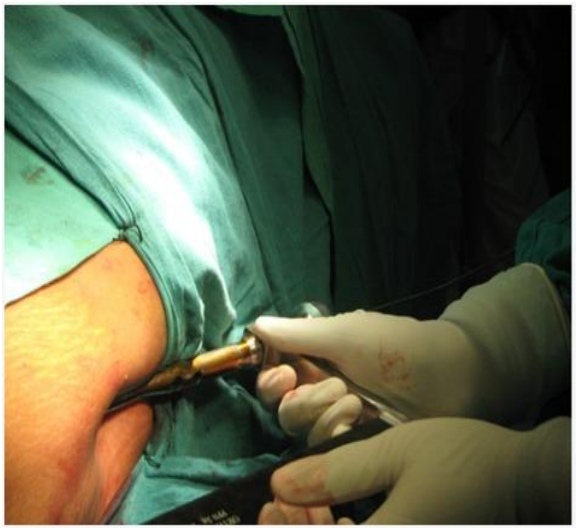


Fig 3: Insertion of PFN nail with Drill guide and nail assembly

Fig 4 Intra operative c-arm pictures of PFN

METHODOLOGY (MATERIALS & METHODS) **Study topic**: Comparison of Proximal femoral nail versus Dynamic Hip Screw for treatment of Intertrochanteric fractures.

Study Design: Prospective Study. **Study Venue**: Department of Orthopaedics, Alluri Sita Rama Raju Academy of Medical Sciences.

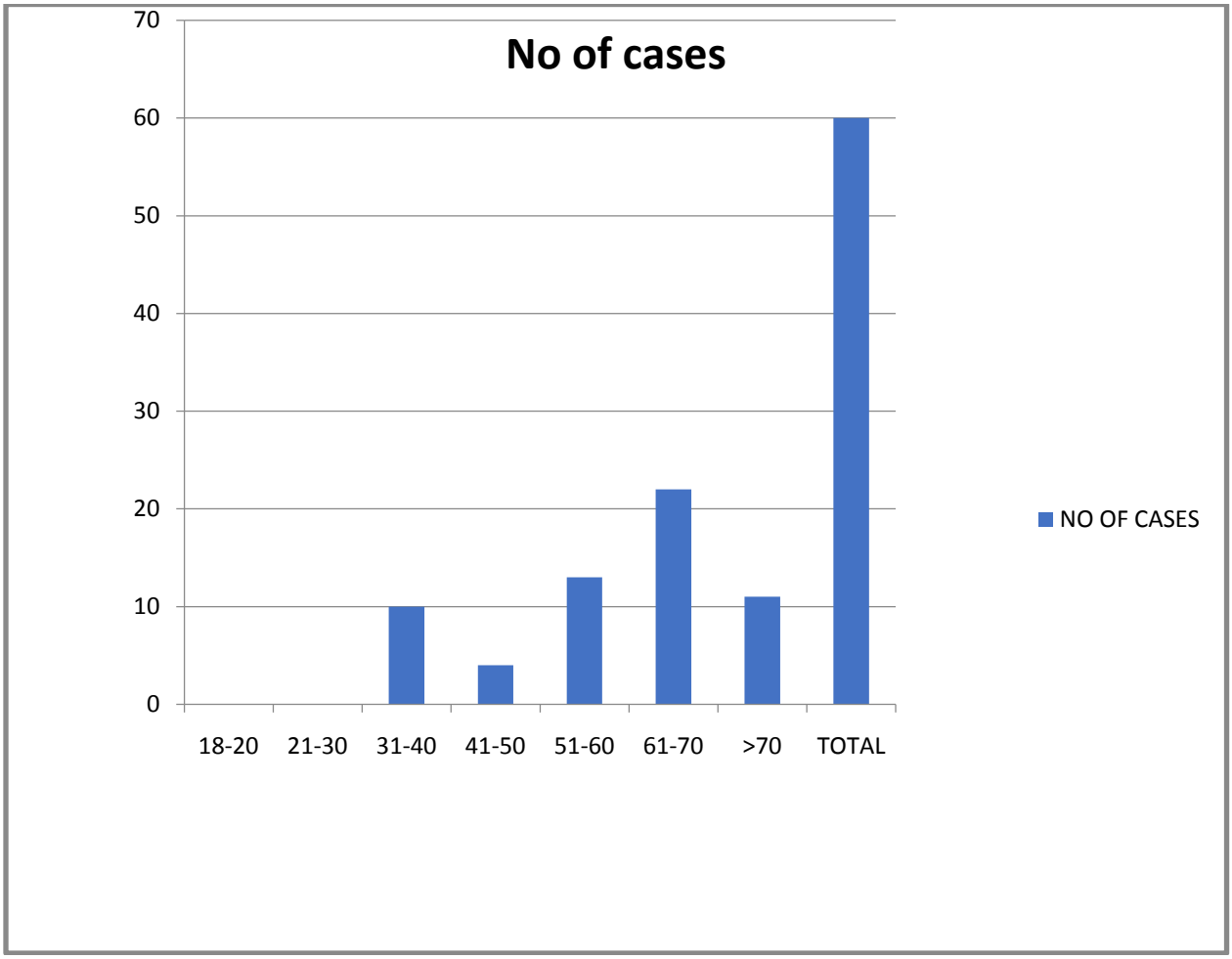
Sample Size: Sixty (60).**Study Period** : October 2020 to October 2022.

Data Collection: Collection of data as per proforma with consent from the patients admitted in Orthopaedic ward, Alluri Sita Rama Raju Academy of Medical Sciences, Eluru.

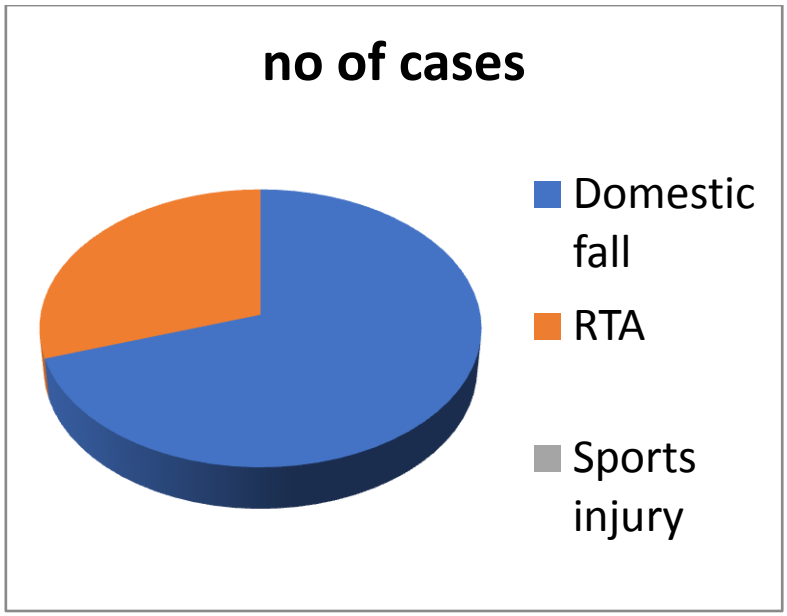
Inclusion Criteria_All patients with fresh inter-trochanteric fracture femur, Age - Patients above age of 18 years, Sex - Both males & females were included.

Exclusion Criteria: Patients below age of 18 years, Patients with old or malunited intertrochanteric fractures treated elsewhere, Medically unstable patients who were at poor risk for surgery.

In our study maximum age was 80 years and minimum age was 31 years. The mean age was 59.38 years. The majority of patients were between 51-70 years of age, which constitutes 58.35% of total cases.



The commonest mode of injury in our series were domestic falls which constituted 42(70%) of the cases.



III. Results

In our study ,the average duration of hospital stay was 9.86days for DHS patients and 9.30 days for PFN patients. The mean time of full weight bearing was 10.75 weeks for PFN and 14.42 weeks for DHS . All the patients enjoyed good range of hip and knee movements except 2patients one treated with PFN and one treated with DHS. The mean time of radiological union was 19.57weeks for PFN and 22.04weeks for DHS.

	PFN	**DHS**	
Mean duration of Hospital stay (in days)	9.30	9.86	t=0.5301 p=0.5981
Mean time for full weight bearing (in weeks)	10.75	14.42	t=8.6779 p<.0001
Mobility after surgery(6 weeks post operatively)			
Independent	56/58	51/57	
Aided	2	6	
Non-ambulatory	0	0	
Mean time for Radiological union(in weeks)	19.57	22. 04	t=5.4850 p<0.0001

IV. Discussion

Inter-trochanteric fractures of the femur are one of the most common fractures in the elderly. They often occur due to low energy trauma like trivial falls at home. The high prevalence of these fractures is related to several factors like osteoporosis, malnutrition, decreased physical activity, impaired vision, neurological impairment and altered muscle balance. Women are more commonly affected due to the added risk of post menopausal osteoporosis. Hip fractures pose a significant health care problem world-wide, with an annual incidence of approximately 1.7 million patients. The goal of treatment therefore should be to achieve stable fixation of these fractures, so that these patients can be mobilized as early as possible to avoid the dangers of prolonged recumbency.

Trochanteric fractures were mainly treated conservatively with bed rest and skeletal traction till the early part of the 20th century. With advances in anaesthesia and improvements in aseptic techniques, surgical management of these fractures became a viable option [5]. The number of implants which have been used over the years for fixation of trochanteric fractures is testimony to the fact that they were not universally successful. The optimal surgical management of patients with unstable inter-trochanteric fractures is yet to be found. However for the past 3 decades or so the sliding hip screw (Dynamic hip screw-DHS) has been the workhorse in fixing these fractures and any newer implants have to be compared to the DHS for assessing results [6],[10].

The proximal femoral nail (PFN) has emerged as a viable alternative to Dynamic hip screw (DHS) in the fixation of inter-trochanteric fractures. Various studies have even found it superior to the DHS, especially when the fracture configuration is unstable [7].

The factors which influence the stability of fixation are loss of postero-medial cortex, reverse oblique fractures, shattered lateral wall, extension into femoral neck area and poor bone quality[8].

Evans observed that the key to a stable fixation is restoration of posteromedial cortex [9]. In stable fracture patterns, the posteromedial cortex remains intact or has minimal comminution, making it possible to obtain stable reduction. Unstable fractures on the other hand, are characterized by greater comminution of the posteromedial cortex. These fractures can be converted to a stable reduction if medial cortex apposition is obtained. Reverse oblique fractures are inherently unstable. The femoral shaft tends to displace medially by the downward and outward sliding of the greater trochanter[11].

Poor bone quality is common in most inter-trochanteric fractures as they occur in an elderly population. Thus screw cut-out can occur when an implant like DHS is used and an intramedullary device like PFN may be preferable.

Avakian Zundertook a retrospective audit of 144 patients who received a DHS or a PFN for trochanteric fractures .They found no statistically significant differences in various post operative outcomes in 2 groups[12].

Mehboob I conducted a retrospective review of 26 cases of trochanteric fractures treated with PFN. He found that the operating time was short with less blood loss during surgery. He concluded that PFN is a suitable implant for unstable intertrochanteric fractures [13].

Ballal MS reviewed 160 trochanteric fractures fixed with PFN, and found 8 failures overall. He concluded that poorly reduced fractures tend to fail early, whereas late failures are due to non union and advised that good reduction with minimal dissection, use of appropriate nail length and proper positioning of nail and screws are necessary to avoid failure [14].

In our study, inter-trochanteric fractures were common in age group of 51-70 years which constituted 58.35% of total cases. The mean age was 59.38years. The maximum age was 80 years and minimum age was

31years. This is on expected lines as osteoporosis is common in the elderly . The incidence of inter-trochanteric fractures was more in males (66.67%) than females (33.33%) in our study. The high incidence of intertrochanteric fractures in males might be due to more males being involved in road traffic accidents and females not reporting or reporting late to our hospital. The right side (58.33%) was more commonly involved than left side (41.67%). The commonest mode of injury in our series were domestic falls which constituted 70% of cases. This correlates well with most series reported. Road traffic accidents accounted for the other 30% of cases.

Intertrochanteric fractures of femur were classified according to Boyd and Griffin classification in our study [15]. Type1 and type2 fractures constituted 46 cases (76.67%) and type 3 and type 4 constituted 14cases (23.33%).

Sliding hip screws have been compared to intra-medullary by a number of authors. In a study of 186 patients, Leung et al found that those treated with Gamma nail had less blood loss and earlier return to full weight bearing than those managed with DHS [16].

Intra-medullary devices like the PFN have certain advantages. They require a smaller incision, less soft tissue dissection and hence blood loss is less. Being a load-sharing device, they provide more efficient load transfer than DHS. The shorter lever arm also helps in decrease the tensile strain on the implant, thus reducing the chances of implant failure. A fractured lateral wall is also not a risk factor for failure as it is in the case of DHS [17]. However, the procedure is more technically demanding and has a longer learning curve. Also, complications like femoral shaft fracture due to stress riser effect, penetration of anterior femoral cortex and missed targeting of locking can occur.

V. Conclusion

1. Inter-trochanteric fractures were most common between the ages of 61-70 years in our series.
2. A trivial fall at home was the most common mechanism of injury(70%).
3. Incision length was smaller for proximal femoral nail.
4. Blood loss was less for PFN (197ml) as compared to DHS (304 ml) ($p < 0.001$).
5. Radiation exposure was more for PFN (78 shoots) than DHS (45 shoots) ($P<0.0001$)
6. The mean duration of operation was 87 minutes for PFN and 79 minutes for DHS ($P=0.0590$).
7. There were no significant differences in the intra-operative complications with both implants.
8. The mean time for full weight bearing was 10.75 weeks for PFN and 14.42 weeks for DHS ($P<0.0001$).
9. The mean time for radiological union was 19.57 weeks for PFN and 22.04 weeks for DHS, which was statistically significant ($P<0.0001$).
10. There was no significant difference in average duration of hospital stay between the two groups.
11. Functional results based on Harris hip score (ability to sit crossed leg, squat, absence of hip pain, independent mobility) were better with PFN.
12. There were more excellent/good results with PFN (93%) as compared to DHS (78%). There was one poor result with DHS and none with PFN.

Conclusion: Overall, we believe that with experience, operative time and radiation exposure can be reduced in case of PFN. Thus we conclude that PFN is a better alternative to DHS in the management of inter-trochanteric fractures.

References

[1]. Jonnes C, Sm S, Najimudeen S. Type II Intertrochanteric Fractures: Proximal Femoral Nailing (PFN) Versus Dynamic Hip Screw (DHS). Arch Bone Jt Surg. 2016 Jan;4(1):23-8. PMID: 26894214; PMCID: PMC4733231.

[2]. Kannus P, Parkkari J, Sievänen H, et al. Epidemiology of hip fractures. Bone. 1996;18 (Suppl 1):57–63.

[3]. Radford PJ, Needoff M, Webb JK. Aprospective randomised comparison of the dynamic hip screw and the gamma locking nail. J Bone Joint Surg Br. 1993;75(5):789–93.

[4]. Xiao Huang, Frankie Leung, Zhou Xiang, Pei-Yong Tan, Jing Yang, Dai-Qing Wei, Xi Yu, "Proximal Femoral Nail versus Dynamic Hip Screw Fixation for Trochanteric Fractures: A Meta-Analysis of Randomized Controlled Trials", The Scientific World Journal, vol. 2013, Article ID 805805, 8 pages, 2013.

[5]. A.O; Orthopaedic Trauma Association Committee for coding and classification of Fracture and dislocation Compendium, *J Orthop trauma* 1996; 10(1): 30-35.

[6]. Hacking, C., Bell, D. Dynamic hip screw. Reference article, Radiopaedia.org. (accessed on 30 Oct 2022) https://doi.org/10.53347/rID-37374.

[7]. Bartoníček J, Rammelt S. The history of internal fixation of proximal femur fractures Ernst Pohl-the genius behind. Int Orthop. 2014 Nov;38(11):2421-6. Doi : 10.1007/s00264-014-2320-3. Epub 2014 Apr 1. PMID: 24687268.

[8]. Larson.S, Freiberg.S, and Hansson L: Trochanteric fractures mobility, complication and mortality in 60 cases treated with the sliding screw technique, *Clin.Orthop* 1990; 260:232-241

[9]. Enders HG: Treatment of peritrochanteric and sub-trochanteric fractures of femur with Enders pins in the hip, St Louis ,1978 Mosby Elsevier.

[10]. Bong MR, Patel V, Lesaka K et al : Comparison of a sliding screw with a trochanteric lateral support plate to an intramedullary hip screw for fixation of unstable intertrochanteric hip fractures a cadaver study,

[11]. *J trauma*2004; 56:791

[12]. Buchloz WR, HeckmanDT, BrownCC: Intertrochanteric fractures, Rockwood and Green's Fractures in Adult. Md : Lippincott and Williams and Wilkins,6th edn;2006:1794- 1823.

[13]. Avakian Z –Dynamic hip screw versus proximal femoral nails for intertrochanteric fractures; *ANZ J Surg* JAN 2012; 82(1-2):56-9 (MEDLINE).
[14]. Mehboob I: Proximal femoral nail in intertrochanteric fractures, JNMA J Nepal Med Assoc OCT 2009; 48(176):273-5 .
[15]. Balla MS- J Orthop (Hong kong) AUG 2008;16(2):146-9(MEDLINE).
[16]. Boyd HB and Griffin LL: Classification and treatment of trochanteric fractures, *Arch Surg* 1949; 58: 853-866
[17]. Bong MR, Patel V, Lesaka K et al : Comparison of a sliding screw with a trochanteric lateral support plate to an intramedullary hip screw for fixation of unstable intertrochanteric hip fractures a cadaver study, *J trauma*2004; 56:791.
[18]. Docquiet PL, Manche E, Actrique JC, Genletb. B: Complications associated with gamma nailing; A review of 439 cases, *Acta Orthop Belg* 2002 Jan 68(3): 251-257.

Puli Gayatri chandrahasa, et. al. "Comparison of Proximal femoral nail versus Dynamic Hip Screw for treatment of Intertrochanteric fractures." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(2), 2023, pp. 22-28.