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# Comparative evaluation of dynamic hip screw and proximal femoral nail for fracture of intertrochanteric femur

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## ABSTRACT

**Background:** The aim of the present study was to compare the result in terms of rate of union, time of ambulation and functional recovery of fracture intertrochanteric femur treated by dynamic hip screw (DHS) and proximal femoral interlocking nail (PFN) and to compare complications in terms of implant failure, infection, blood loss and C arm exposure in both groups.
**Methods:** This was a prospective study of 92 cases, 38 cases were treated by PFN and 54 cases were treated by DHS. Patients were followed up at 6, 12, 18 and 24 weeks. The results were compared for functional outcome using Palmer and Parker score and also for various complications.
**Results:** Comparison of mobility score at six month follow up period revealed the PFN group to be significantly more mobile (5.8 Vs. 4.19 respectively, p <0.001) than the DHS group. In our study 6 patients managed with DHS (6.52%) developed superficial wound infection which responded to intravenous antibiotics. No patient with PFN had wound infection. Only 2 patients in the PFN group and 12 patients in the DHS group had persistent pain at the incision site.
**Conclusions:** Dynamic hip screw fixation of these fracture requires less preoperative time, is associated with less exposure to radiation but the blood loss is much higher. On the contrary PFN allows faster mobilization and greater mobility scores at six months.

Keywords: DHS, PFN, Intertrochanteric femur fracture

## INTRODUCTION

Intertrochanteric fractures are commonly seen in population over 70 years of age due to trivial trauma. In younger population, it is a result of high velocity trauma. Before 1960, most of these were managed conservatively, accompanied with common complications like malunion and shortening resulting in functional impairment for the patient. In the present era, with focus on restoration of anatomy and function without prolonged immobilization, operative management is the first choice of treatment.

DHS is an eccentric load sharing device and a time tested procedure to manage these fractures but is associated with open reduction, loss of fracture haematoma, periosteal stripping, and extensive soft tissue dissection. Arbeitsegmenin Schaftfur Osteo Synthes Fragen (AO/ASIF) in 1996 designed a new medullary device, the- proximal femoral nail (PFN).[1,2] Closed proximal femoral nail overcomes these shortcomings associated with dynamic hip screw. Its biomechanical properties like a being an axial, load bearing device with a short lever arm, greater implant length, smaller and flexible distal ends and an additional antirotational screw in femoral neck may offer significant advantage over dynamic hip screw (DHS).

This study was conducted to evaluate radiological union, operative time, perioperative blood loss, functional recovery, infection rate and implant failure among cases

of intertrochanteric fractures, stable or unstable, fixed by either DHS or PFN.

## METHODS

Present study was conducted in the Department of orthopaedic surgery, Motilal Nehru Medical College, Allahabad, after taking clearance of ethical committee of MLN medical college, during the period between June 2013 and June 2015. All cases of traumatic intertrochantric fractures presenting to the emergency or outdoor were included in the study, subject to written informed consent. Patients were followed up at 6, 12, 18 and 24 weeks.

### *Inclusion criteria*

Patients with age 20 and above, patients with closed intertrochanteric fracture femur

### *Exclusion criteria*

Patient not giving consent not fit for surgery after proper work up pre-anaesthetic check-up and lack of follow up for at least six months

Age, sex, Minimental test score, ASA scores, stable or unstable fracture pattern, prefracture mobility score, mode of trauma, operating time, preoperative blood loss, number of c-arm exposures, duration of hospital stay, time to mobilization with a frame, preoperative and postoperative Palmer and Parker scores at six months, and complications like infection, knee pain and stiffness were recorded using a pilot tested performa.

An anterio-posterior view of pelvis with both hip in 15 degree internal rotation and a lateral view of the involved hip were used to classify the patients according to the AO classification. All the patients had similar antibiotic coverage, and spinal or epidural anaesthesia as decided by the consultant anaesthetist. Closed reduction was done under C-arm guidance and the fracture was fixed either by DHS or PFN by the same set of surgeons. Postoperatively AP and lateral radiographs were used to asses for adequacy of reduction and position of the screw within the head.

**Figure 1: Intertrochanteric fracture managed by PFN.**

**Figure 2: Intertrochanteric fracture managed by DHS.**

## RESULTS

A total of 96 patients with intertrochantic fracture presented to the emergency department or outdoor. Of these, four patients could not be followed. Among the female patients, nearly 72.7% sustained a fracture due to a minor fall. Among the male patients 74.4% sustained a fracture due to road traffic accident. Forty six cases (50%) were stable. According to AO classification 28.2% were A1, 39.1% were A2 and 34.9% were A3.

Of the 92 cases included in our study, 38 cases were treated by PFN and 54 cases were treated by DHS. No significant difference was found in age, minimental test score, prefracture mobility score, ASA scoring, mode of trauma, distribution of stable and unstable fractures in the two groups and preoperative Palmer and Parker scores as shown in Table 1.

Mean operating time (60 minutes for PFN and 45.3 minutes for DHS; $p < 0.001$) and mean number of radiation exposure with C arm (194.44 for PFN and 90.40 for DHS; $p < 0.001$) was found to be significantly higher for the PFN group. There was significantly increased mean perioperative blood loss in DHS group (154.03 ml Vs. 70.52 ml respectively, $p < 0.001$). Compared to the DHS group, PFN group had significantly less time to mobilization with frame (8.84 days Vs. 14.42 days, $p < 0.001$). DHS patients had significantly higher length of hospital stay (17 days for DHS and 15 days for PFN) as given in Table 2.

Six patients in the DHS group and none in the PFN group developed superficial wound infection. At 6 month significantly more patients in DHS group were having pain around hip (12 in DHS and 2 in PFN). All patients in our study had radiological union at 6 month some with good callus and some with fair callus response. Only 4 patients in DHS group had knee stiffness which improved after aggressive physiotherapy. In our study we found 2 case of implant failure (screw cut out) in DHS group. The implant was removed and the patient was managed conservatively due to decreased life expectancy and high morbid status (ASA score 3) of the patient. No screw migration seen in the PFN group patients as in Table 2.

Preoperative parker and palmer mobility score were similar in both the groups. However mobility score at six month follow up were found to be significantly higher in the PFN group (5.8 for PFN and 4.19 for DHS, p <0.001). 40% of the PFN group regained their prefracture mobility score compared with 25% for the DHS group as shown in Table 2.

For unstable fractures, mobility score at six months were significantly higher for the PFN group (5.46 for PFN and 3.50 for DHS; p <0.001). For stable fractures no significant difference was detected in the two groups (6.17 for PFN and 4.89 for DHS; p >0.05).

**Table 1: Baseline characteristics of patients.**

| | | Total | PFN | DHS |
|---|---|---|---|---|
| **No. of patients** | | 92 | 38 | 54 |
| **Male** | | 58 | 26 | 22 |
| **Female** | | 34 | 12 | 22 |
| **Mean age in years** | | 55.72 | 55.64 | 55.81 |
| **Mean mini mental test score** | | 17.26 | 17.48 | 17.11 |
| **Mean pre fracture mobility score** | | 6.46 | 6.64 | 6.28 |
| **Fracture Type** | Stable | 46 (50%) | 20 (43.37%) | 26 (56.5%) |
| | Unstable | 46 (50%) | 18 (39.1%) | 28 (60.8%) |
| **American society of anaesthesiologist score (%)** | 1 | 30 (32.6%) | 14 (36.8%) | 16 (29.9%) |
| | 2 | 48 (52.2%) | 14 (36.8%) | 34 (63%) |
| | 3 | 12 (13.0%) | 8 (21%) | 4 (7.4%) |
| | 4 | 2 (2.3%) | 2 (5%) | 0 (0.0%) |
| **Mode of trauma** | RTA | 54 | 20 (52.69%) | 34 (62.9%) |
| | Others | 38 | 18 (48.3%) | 20 (37.1%) |

**Table 2: Comparing observed parameters in the two groups.**

| | | PFN | DHS | p-Value |
|---|---|---|---|---|
| **Mean time to mobilization with frame (in days)** | | 8.84 | 14.42 | <0.001 |
| **Mean operating time (in minutes)** | | 60 | 45.3 | <0.001 |
| **Mean no. of radiation exposure with c- arm** | | 193.57 | 90.40 | <0.001 |
| **Mean peri operative blood loss (in ml.)** | | 70.52 | 154.03 | <0.001 |
| **Average length of hospital stay (in days)** | | 15 | 17 | |
| **Preoperative P&P score** | | 6.64 | 6.28 | >0.1 |
| **Six month P and P score** | | 5.8 | 4.19 | 0.001 |
| **Six month P & P score in stable fractures** | | 6.17 | 4.89 | >0.05 |
| **Six month P and P score in unstable fracture** | | 5.46 | 3.50 | 0.001 |
| **Complications (No of patients)** | Infection | 0 | 6 | |
| | Pain | 2 | 12 | |
| | Knee stiffness | 0 | 4 | |

## DISCUSSION

The average age of patients in this study was 50.92 years for male patients and 64.27 years for female group. A higher age at presentation has been reported by Age at the time of fracture has been reported by Harrington and Johnston, Hunter, Kuderna et al, Zickel, Cuthbert and Howat, Poigenfurst and Schnabl, Laskin et al, Hall and Ainscow, Saudan, Lubbelee A, Sadowski C, and Tyllionksi et al.[3-12] This may be due to large scale adoption of measures to prevent fractures in the developed countries.

In our study, 58 cases (63%) were male and other 34 (37%) were females. A preponderance of female sex has been reported by Harrington and Johnton, Kuderna et al, Poigenfurst and Schnable, Laskin et al and Heyse-Moore et al.[3,5,8,9,13] The reason for the difference could be because of high number of road traffic accident cases included in the study. Males are more susceptible to road traffic accidents and hence the preponderance of males in our study. A higher prevalence of stable fractures has been reported by Kuderna et al, Hughston et al, Wilson et al and Wolfgang et al.[5,14-16] However Neilson et al reported a higher prevalence of unstable fractures in their studies.[17] We had 50% prevalence of both stable and unstable fractures.

The ability to resume ambulation after intertrochanteric fractures is related to several factors besides simple

fracture healing. Cummings et al have reported social situation, nutrition and chronologic age to be important factors determining the time to mobilization.[18] Little et al have suggested medical comorbidities and post-operative factors like pain and muscle dysfunction to be factors determining time to mobilization.[19]

Nuber et al have reported full weight bearing immediately after the operation for 97% of PFN patients and 88% of DHS patients.[20] Little et al have reported mean time to mobilization of 3.6 days for Holland nail and 4.3 days for DHS patients.[19] Time to mobilization was 8.84 days in the PFN group and 14.42 days in DHS group in our study.

***Radiological union***

In the present series of patients union were obtained in all cases treated by DHS and PFN group.

***Operating time and radiation exposure***

We report a significantly higher mean operating time for PFN compared with DHS group, findings which are similar to that reported by Little et al.[19] The mean number of radiation exposures with C-arm was significantly higher for PFN than DHS ($p < 0.001$), findings which are similar to that reported by Little et al.[19] However Nuber et al and Leung et al and have reported shorter operative times with proximal femoral nails.[20,21]

***Functonal results (Parker and Palmer mobility score)***

Comparison of mobility score at six month follow up period revealed the PFN group to be significantly more mobile (5.8 Vs. 4.19 respectively, $p < 0.001$) than the DHS group. Mobility scores at 6 months were significantly higher for unstable fractures in the PFN group. Mobility scores for stable fractures were higher in the PFN group but the difference was not found to be significant. 40% of the patients in the PFN group regained their pre-fracture mobility, compared with 25% in the DHS group.

***Complications***

According to available literature the incidence of wound infection after operative treatment of trochanteric fractures varies from 1.7% to 16.9%. In our study 6 patients managed with DHS (6.52%) developed superficial wound infection which responded to intravenous antibiotics. No patient with PFN has wound infection. Only Two patient in the PFN group and 12 patients in the DHS group had persistent pain at the incision site.

## CONCLUSION

DHS fixation of these fracture requires less preoperative time, is associated with less exposure to radiation but the attendant blood loss is much higher. On the contrary PFN allows faster mobilization and greater mobility scores at six months. A study with a longer follow up duration is needed to assess the long term mobility results for DHS and PFN.

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## REFERENCES

1. Gadegone Wasudeo M, Salphale Yogesh S. Short proximal femoral nail fixation for trochanteric fractures, J Orthopaed Surg. 2010;18(1):39-44.
2. Terry Canale S, Beaty JH. Campbell's Operative orthopaedics. 11th edition. Elsevier; 2008: 3239.
3. Harrington KD, Johnston JO. The management of comminuted Unstable Intertrochanteric Fractures. J Bone Joint Surg. 1973;55:1367-76.
4. Hunter GA. The Results of operative Treatment of trochanteric fractures of the Femur. Injury. 1975;6:202-5.
5. Kuderna H, Bohler N, Colby AJ. Treatment of Intertrochanteric and Subtrochanteric Fractures of the Hip by Ender method. J Bone Joint surg. 1976;58:604-11.
6. Zickel Robert E. An Intramedullay Fixation Device for the proximal part of the Femur J. Bone Joint Surg. 1976;58:866.
7. Cuthbert H, Howat TW. The use of Kuntscher Y-nail in the treatment of intertrochanteric and subtrochanteric fractures of Femur. Injury. 1976;8:135-42.
8. Poigenfürst J, Schnabl P. Multiple intramedullary nailing of pertrochanteric fractures with elastic nails: operative procedure and results. Injury. 1977;9(2):102-13.
9. Laskin RS, Gruber MA, Zimmerman AJ. Intertrochanteric fractures of the Hip in the Elderly. Clin Orthop. 1979;101:110-9.
10. Hall G, Ainscow DAP. Comparison of Nail plate fixation and Enders Nailing for intertrochanteric fractures. JBJS. 1981;63:24-8.
11. Saudan M, Lübbeke A, Sadowski C, Riand N, Stern R, Hoffmeyer P. Pertrochanteric fractures : is there an advantage to an intramedullary nail?: a randomized, prospective study of 206 patients comparing the dynamic hip screw and proximal femoral nail. J Orthop Trauma. 2002;16(6):386-93.
12. Tyllianakis M, Panagopoulos A, Papadopoulos A, Papasimos S, Mousafiris K. Treatment of extracpsular hip fractures with the proximal femoral nail long term results in 45 patients. Acta Orthop Belg. 2004;70(5):444-54.
13. Heyse-Moore GH, MacEachern AG, Evans DC. Treatment of Intertrochanteric Fractures of the Femur. A comparison of the Richards screw-Plate

with the Jewett Nail plate. J Bone Joint surg. 1983;65:262-7.
14. Hunghston JC. Unstable Intertrochanteric Fractures of the Hip. J Bone joint Surg. 1964;46:1145.
15. Wilson HJ, Rubin BD, Helbig FE, Fielding JW, Unis GL. Treatment of intertrochanteric fractures with the Jewett nail:experience with 1,015 cases. Clinical Orthopaedics. 1980;148:186–91.
16. Wolfgang GL, Bryant MH, O' Neil JP. Treatment of Intertrochanteric Fracture of the Femur Using Sliding Screw Plate Fixation. Clin Orthop. 1982;163:148-58.
17. Nielsen B, Jelnes R, Rasmussen LB, Ebling A. Trochanteric Fractures Treated by the Mc Laughlin Nail and plate. Injury. 1985;16(5):333-6.
18. Cummings SR, Phillips SL, Wheat ME, Black D, Goosby E, Wlodarczyk D, et al. Recovery of function aftrr hip fracture. The role ofsocial supports. J Am Geriatr Soc. 1988;36:801-6.
19. Little NJ, Verma V, Fernando C, Elliott DS, Khaleel A. A prospective trial comparing the Holland nail with the dynamic hip screw in the treatment of intertrochanteric fractures of the hip. J Bone Joint Surg Br. 2008;90(8):1073–8.
20. Nuber S, Schönweiss T, Rüter A. Stabilisation of unstable trochanteric femoral fractures. DHS with trochanteric stabilization plate vs PFN. Unfallchirurg. 2003;106(1):39-47.
21. Leung KS, So WS, Shen WY, Hui PW. Gamma nails and dynamic hip screws for peritrochanteric fractures. J Bone Joint Surg. 1992;74:345.

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