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**Original Research Article**

# Comparative study between proximal femoral nailing versus dynamic hip screw in unstable inter-trochanteric fractures of the femur in adults

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## ABSTRACT

**Background**: Hip fractures are more common in elderly among them intertrochanteric fractures are most common, more than 50% fractures are unstable. The proximal femoral nailing (PFN) and dynamic hip screw (DHS) are frequently used modalities from last two decades in both stable and unstable fractures. The DHS has been shown to produce good results but complications are frequent, particularly in unstable inter-trochanteric fracture. The advantage of PFN fixation is that it provides a more biomechanically stable construct with good collapse control. The goal of this study was to compare the clinical and radiographical results of the DHS and PFN for the treatment of inter-trochanteric hip fractures as one is load bearing another is load shearing.
**Methods**: In our study we included 70 inter-trochanteric fractures, out of which 40 were treated with DHS fixation and 30 were treated with PFN, and were followed up at regular intervals of 2 weeks, 8 weeks, 12 weeks, 6 months and annually thereafter.
**Results**: The functional results were assessed with Harris hip score and observed 35% excellent results in DHS group and 63.3% excellent results in PFN group. We observed no statistically significant difference between two groups in view of late and early complications and time to union. We observed significantly better outcomes in PFN group for unstable inter-trochanteric fractures and in unstable fractures reduction loss was significantly lower in PFN group. We observed total duration of surgery was significantly lower in PFN group.
**Conclusions:** We concluded that PFN may be the better fixation device for most unstable inter-trochanteric fractures.

**Keywords:** Inter-trochanteric fractures, DHS, PFN

## INTRODUCTION

Hip fractures are more common in elderly and among them inter-trochantric accounts approximately half of cases, more than 50% fractures are unstable.[1,2] The goal of treatment of any inter-trochanteric fracture is to restore mobility safely and efficiently while minimizing the risk of medical complications and restore the patient to pre-operative status. The DHS has gained widespread acceptance in the last two decade and is currently considered as the standard device for comparison of outcomes. The DHS has been shown to produce good results but complications are frequent, particularly in unstable inter-trochanteric fracture. The advantage of PFN fixation is that it provides a more biomechanically stable construct by reducing distance between hip joint and implant.[3,7] The goal of this study was to compare the clinical and radiographical results of the DHS and PFN for the treatment of intertrochanteric hip fractures.

## METHODS

The prospective study was conducted in department of orthopedics govt. medical college and hospital Jammu

from June 2018 and July 2020. The fractures were divided into two groups for analysis: Group 1 (40 patients): fractures treated with DHS and group 2 (30 patients): Fractures treated with PFN (Table 1).

**Table 1: Distribution of patients according to gender in both groups.**

| Study group | M/F (30/40) | Age (years) | Fracture pattern | | |
|---|---|---|---|---|---|
| | | | A1 | A2 | A3 |
| **DHS** | 16/24 | 30-75 | 10 | 12 | 18 |
| **PFN** | 14/16 | 30-75 | 05 | 15 | 10 |

According to AO/OTA classification:[1,9] A1 fractures are simple, two-part fractures, A2 fractures have multiple fragments, A3 fractures includes reverse oblique and transverse fracture patterns

***Inclusion criteria***

Patients in age group of 30-75 years, either sex, closed injury and injury <2 weeks old were included in the study.

***Exclusion criteria[9]***

Patients who had less than 1.5 years of follow-up, bilateral fractures, pathological fractures, fractures associated with polytrauma, preexisting femoral deformity and subtrochanteric fractures were excluded from the study.[1-5,8]

The cause of injury included road traffic accident in 40 (57%) patients and fall from height in the 30 (43%) patients.

**Table 2: Harris hip score for functional assessment of hip.**

| Parameters | Grading of Harris hip score |
|---|---|
| **Pain** | <70 points-Poor |
| **Limp** | 70-79 points-Fair |
| **Distance** | 80-89 points-Good |
| **Support** | 90-100 points-Excellent |
| **Sitting** | |
| **Enter public transportation** | |
| **Stairs** | |
| **Put on shoes and socks** | |
| **Absence of deformity** | |
| **Range of motion** | |

The decision for the type of the operation was based on surgeon's preference, prior to hip surgery, each patient was evaluated by the same trauma team. The overall time from injury to surgery averaged 3 days (range: 1-5 days). All surgeries were performed on the traction table following closed reduction confirmed with fluoroscopy on two views. The clinical outcome for each group was analyzed, and intra-operative, early (within first month after hip fracture repair), and late complications (after 1st month) were recorded. Patients were followed up at regular intervals of 2 weeks, 8 week, 12 weeks, 6 months and annually thereafter. Their functional outcome was assessed with Harris hip scores and results were graded as excellent, good, fair, poor depending on various parameters (Table 2).

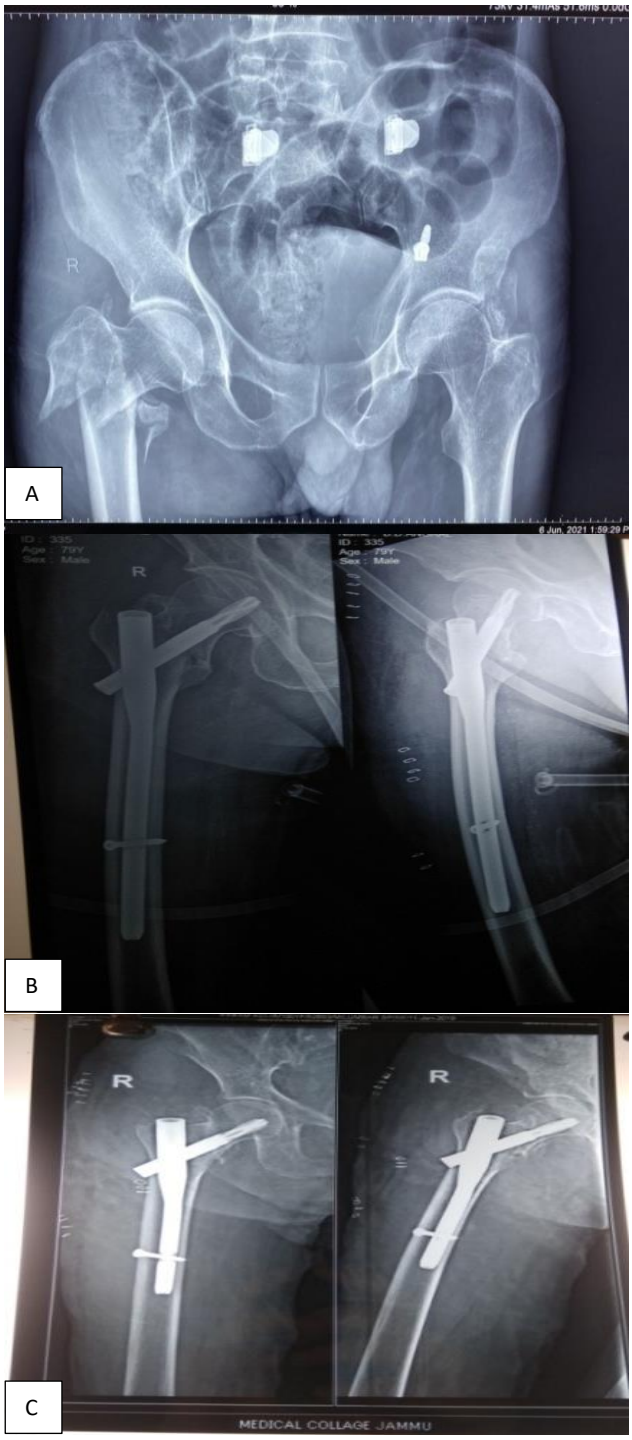


**Figure 1: (A, B and C) Pre operative X-ray and post-operative X-rays of PFN.**

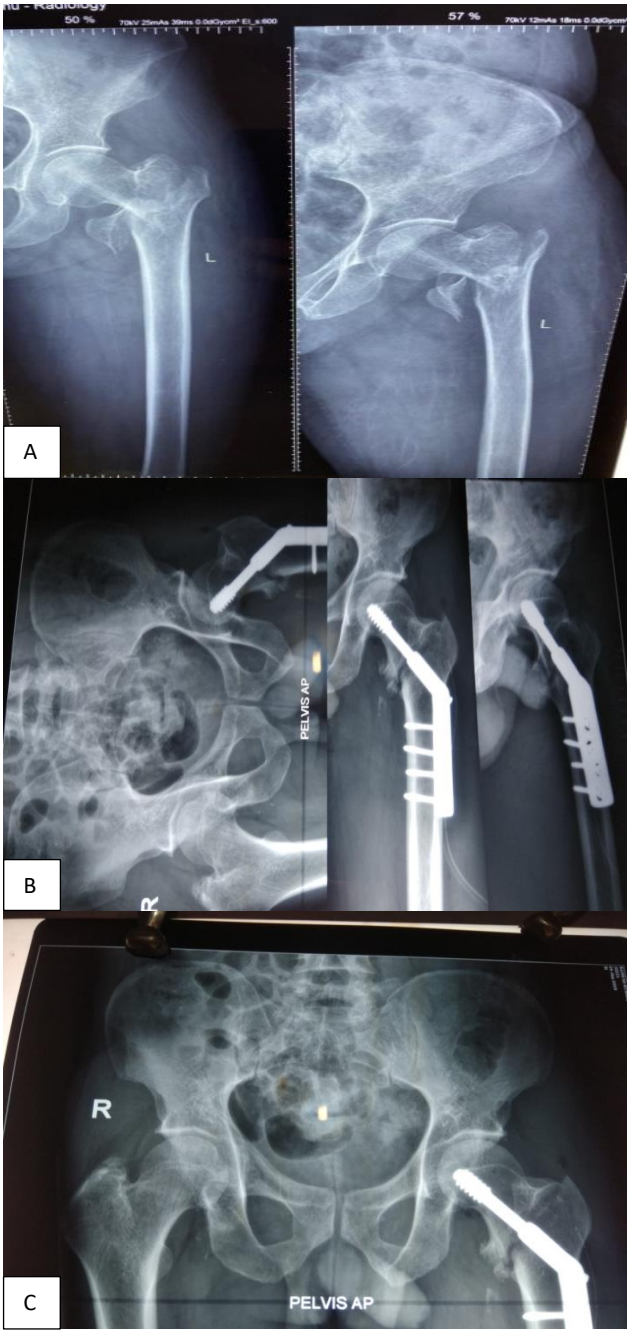


**Figure 2: (A, B and C) Pre-operative X-ray and post-operative X-rays of DHS.**

## RESULTS

The present study included 70 patients with inter trochanteric fractures which were managed with DHS and PFN. Mean age of the study participants was 50 years (range 30-75 years). In this study, 30 (42.85%) were males and 40 (63.3%) were females. The outcome was studied using scoring by Harris hip score. we found 14 (35%) patients had excellent results in group 1 and 19 (63.3%) in group 2, patients with good results are 22 (55%) in group 1 and 9 (30%) in group 2, patients with fair results are 3 (7.5) in group 1 and 2 (6.6) in group 2 and patients poor results are 1 (2.5) in group 1 and no patient with poor results in group 2. Early complications we noted were, hematoma, superficial infection and deep vein thrombosis (Table 3). Late complications we noted were reduction loss, non-union, implant failure and late infection (Table 4). There was no z-effect or reverse z effect.

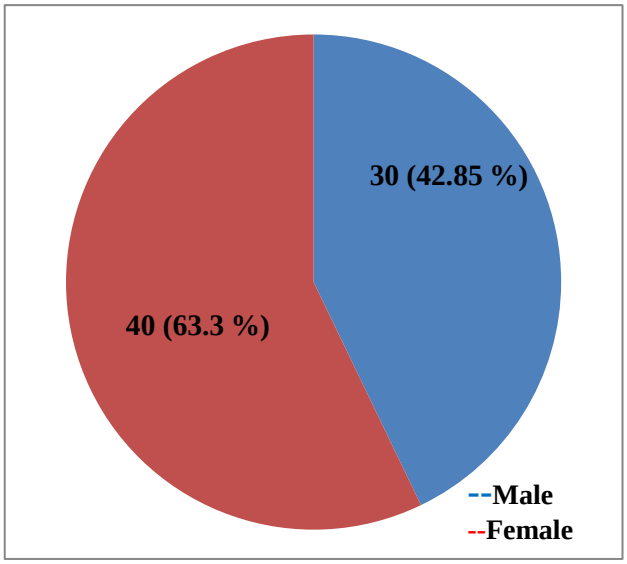


**Figure 3: Sex distribution.**

**Table 3: Functional outcome achieved in present study.**

| Outcome | No. of patients (Group 1) (%) | No. of patients (Group 2) (%) |
|---|---|---|
| **Excellent** | 14 (35) | 19 (63.3) |
| **Good** | 22 (55) | 9 (30) |
| **Fair** | 3 (7.5) | 2 (6.6) |
| **Poor** | 1 (2.5) | 0 |
| **Total** | 40 (100) | 30 (100) |

**Table 4: Early complications.**

| Early complications | Group 1 | Group 2 | Total |
|---|---|---|---|
| **Hematoma** | 0 | 0 | 0 |
| **Superficial infection** | 4 | 1 | 5 |
| **Deep vein thrombosis** | 1 | 0 | 1 |
| **Total** | 5 | 1 | 6 |

**Table 5: Late complications.**

| Late complications | Group 1 | Group 2 | Total |
|---|---|---|---|
| **Reduction loss** | 2 | 0 | 2 |
| **Non union** | 0 | 0 | 0 |
| **Implant failure** | 2 | 1 | 3 |
| **Late infection** | 2 | 0 | 2 |
| **Total** | 5 | 1 | 5 |

## DISCUSSION

Pertrochanteric hip fractures still are a major orthopedic challenge, and those that are unstable have the poorest prognosis despite the fact that union rates are high in intertrochanteric hip fractures, functional outcomes tend to be disappointing. intertrochanteric fractures AO type 31-A2.2-A3.3 are unstable and have poorest prognosis. This extremely unstable fracture results in a severe and prolonged period of postoperative disability. Fracture collapse is one of the postoperative complications reported in association with these fractures.

There was only 1 intra-operative complication in group 1. A closed reduction could not be achieved, and open reduction was performed. There were three intra-operative complications in group 2. Two of them had a difficult closed reduction, and one had a difficult nail insertion. Here was no splintering of greater trochanter or femoral shaft in both groups.

A comparison of intraoperative, early and late complication rates revealed no statistically significant differences between study groups (p=0.324 for intra-operative complications, p=0.223 for early complications, and p=0.357 for late complications). A comparison of time to union demonstrated no statistically significant differences between study groups (p=0.542). The outcome of stable fractures treated with either DHS or PFN were similar, unstable intertrochanteric fractures treated with PFN has significantly better outcomes with all having good results. Out of 18 A3 fractures fracture in group 1, reduction loss occurred in 2 hips and in group 2 it is none. In unstable fractures reduction loss is significantly lower in group 2 than group 1 ($p<0.005$). Total duration of surgery was significantly lower in group 2 than it was in group 1 ($p<0.005$).

Average screw impaction (Fracture collapse) was 6 mm. Jacobs et al reported that the average fracture settling in stable patterns was 5.3 mm and in unstable patterns was 15.7 mm.[10] Sliding of more than 15 mm leads to a higher prevalence of fixation failure. Rha et al reported that excessive sliding was the major factor causing fixation failure in unstable fracture patterns.[11] Average limb length discrepancy was 6 mm. Gross et al found no noticeable functional or cosmetic problems in a study of 74 adults who had less than 2 cm of discrepancy.[12] and 35 marathon runners who had as much as 2.5 cm of discrepancy.[13]

### *Limitations*

The author believes that the sample size in the present study is small.

## CONCLUSION

In comparison to DHS, PFN helps in achieving biological reduction and imparts stability, prevents excessive collapse and limb shortening, less surgical time and less intra operative blood loss and short Hospital stay in unstable type of inter trochanteric fractures. PFN is a load bearing device and gives stability of fracture area proximally and shaft distally, hence biomechanically more stable.

In stable fractures DHS and PFN have similar outcomes. So, in our study we concluded that PFN has better outcome than DHS.

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