



A COMPARATIVE STUDY TO EVALUATE THE FUNCTIONAL OUTCOME OF INTERTROCHANTERIC FRACTURES TREATED USING DYNAMIC HIP SCREW VERSUS PROXIMAL FEMORAL NAIL.

Orthopaedics

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ABSTRACT

Introduction: Intertrochanteric fractures are common in older people, trivial fall is the most common mechanism of injury. Various Operative procedures with different implants were described for the treatment of intertrochanteric fractures. The type of implant used in the treatment has an important influence on complications of fixation. The present study Aims to verify the functional outcome of the fixation of the proximal femoral nail (PFN) and dynamic hip screw device (DHS) and their comparison.

AIM & OBJECTIVES:

1. To compare the efficacy of dynamic hip screw (DHS) and proximal femoral nail (PFN) in the functional outcome and radiological union and assess complication rates of those two internal fixation techniques in managing intertrochanteric fractures.
2. To evaluate functional outcome in intertrochanteric fractures using DHS and PFN by Harris hip score at the end of the study period.

Materials and Methods: The present study has been conducted in Department of Orthopedics of Alluri Sitarama Raju Academy of Medical Sciences. 24 patients with intertrochanteric fractures treated with Dynamic HIP Screw & Proximal Femoral Nailing fixation were selected for the present study.

Results: In DHS group 9 patients were females and 3 were males and in PFN group 7 were males and 5 were females. In the DHS group majority 75 % (9) had a trivial fall followed by 16.7 % (2) had RTA & 8.3 % (1) had fallen from a height, and in the PFN group, majority 66.7% (8) had trivial fall, followed by 16.7% (2) had RTA & 16.7% (2) had fall from height.

Conclusion: In unstable intertrochanteric fractures, the proximal femoral nail has significantly had better outcomes in the earlier restoration of walking ability. Besides, as the proximal femoral nail requires a smaller incision and shorter operative time, it has distinct advantages over dynamic hip screw even instable intertrochanteric fractures. Hence, the proximal femoral nail may be the better fixation device for most intertrochanteric fractures.

KEYWORDS

Intertrochanteric fracture, Dynamic hip screw, Proximal Femoral Nail, Harris Hip Score.

INTRODUCTION:

Intertrochanteric fractures are common in older people, trivial fall is the most common mechanism of injury.¹ Approximately 10-30% of patients die within a year of intertrochanteric fracture.² Various Operative procedures with different implants were described for the treatment of intertrochanteric fractures. The main goal of treating an intertrochanteric fracture is to restore the patient to their pre-injury status as early as possible. The type of implant used in the treatment has an important influence on complications of fixation. Sliding devices like the dynamic hip screw are extensively used for fixation. If the patient bears weight early (comminuted fractures), these devices may penetrate the head or neck, break, bend, or separate from the shaft.

Newer intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer to the extremity mechanical axis by decreasing the lever arm bending moment on the implant. They can also be inserted faster, with low operative blood loss and early weight-bearing with less resultant shortening on long-term follow-up. The present study Aims to verify the functional outcome of the fixation of the proximal femoral nail (PFN) and dynamic hip screw device (DHS) and their comparison.

AIM & OBJECTIVES:

1. To compare the efficacy of dynamic hip screw (DHS) and proximal femoral nail (PFN) in the functional outcome and radiological union and assess complication rates of those two internal fixation techniques in managing intertrochanteric fractures.
2. To evaluate functional outcome in intertrochanteric fractures using DHS and PFN by Harris hip score at the end of the study period.

MATERIALS AND METHODS:

The present study has been conducted in Department of Orthopaedics of Alluri Sitarama Raju Academy of Medical Sciences from November 2018 to November 2019, 24 patients with intertrochanteric fractures treated with Dynamic HIP Screw & Proximal Femoral Nailing fixation were selected for the present study.

INCLUSION CRITERIA:

- Inter trochanteric fractures in adults & elderly.
- Closed intertrochanteric #

EXCLUSION CRITERIA:

- Subtrochanteric fractures
- Compound fractures
- Pathological fractures
- Fractures in children

All the patients with Intertrochanteric # of femur who were admitted to Alluri Sitarama Raju Academy of Medical Sciences were assessed clinically and were hemodynamically stabilized. Radiographs of pelvis with both hips (Anteroposterior view) and full femur (Anteroposterior view and lateral view) were taken for all the admitted patients and fracture was classified according to Boyd & griffin et al.³ Traction was applied to the fractured limb and immobilized till surgery. Basic surgical profile was done and anaesthesia fitness was obtained for all selected patients. Surgery was done over a fracture table in supine position under image intensifier (C-ARM) control Using Standard Technique.

Operative procedure:

Dynamic Hip Screw (DHS) – A straight lateral incision was made. The vastus lateralis muscle was then split. By the use of an angle guide, appoint of entry at the trochanteric flare was chosen under radiographic

control. Into the center of the neck, a 2.5mm tipped threaded guide wire was inserted, and the femur head midway between anterior & posterior cortices to within 10 milli meters from the joint under image intensifier control. The wire length outside was measured using an external device to determine the required screw length. Under radiographic control, the triple reamer was set to the length already measured, and reaming is done over the guide wire. A tap was used for the bone preparation, later a lag screw of appropriate length is inserted. The position of lag screw was again checked on the image intensifier and the barrel were slipped over the lag screw. The guide wire was removed, and the plate is fixed to the femur shaft with screws. The traction was then released, and the fracture is compressed with a compression screw. A suction drain was then inserted & the wound was closed.

Proximal Femoral Nail (PFN) – A lateral skin incision was made extending from the hip of the trochanter proximally for 3-8cm, depending on the size or obesity of the patient. The gluteus maximus aponeurosis was split in line with its fibers from the hip of the trochanter proximally for 5cms, and then the gluteus medius was split in line with its fibers. An entry point was made just medial to the tip of the greater trochanter with a curved awl. A 3.2mm tip threaded guide pin was inserted through the tissue protection guide pin centering sleeve beyond the fracture site. The position of the pin was checked on the image intensifier. The proximal femoral reamer was then used to prepare the proximal portion of the femur. In this study, a 9 or 10mm nail was used depending on the femoral canal diameter with a fixed length of 250mm. The 6-mediolateral angles of the pin allow an easy insertion. The proximal femoral nail was attached to the jig & passed over the guide wire into the proximal femur & across the fracture site in to the femoral shaft. Once the proximal femoral nail was inserted, the femur's head and neck are reamed for the cannulated hip screw, which is 8mm in diameter and varying from 70 to 110mm in length. Under radiographic guidance, the hip screw was inserted into the lower half of the neck of the femur within 5-10mm from the subchondral bone of the femoral head. The stabilization screw, which was 6.4mm in diameter cannulated and varying from 60-100mm in length, was then inserted into the nail's proximal slot under radiographic guidance after the drilling for the same. Then incisions were made, and distal locking bolts were inserted using the jig from the femur's lateral cortex through the slot in the nail. All the incisions were closed, & sterile dressings were applied.

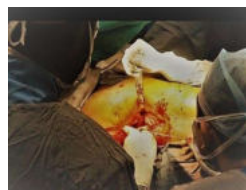
All patients were given peri operative antibiotics for 24-48 hours and the deep venous thrombosis prophylaxis. Patients were allowed to sit-up in bed on the 2nd post-operative day. Static quadriceps exercises were started on the 2nd and 3rd post-operative day. Sutures were removed after 10-14 days.

Patients were mobilized by non-weight bearing as soon as the pain or general condition permitted. Weight-bearing was commenced depending upon the fracture's stability and adequacy of fixation, delaying it for unstable or inadequate fixation patients. All the patients were followed up at six weeks, three months, and 6 months intervals, and check X- rays were taken to assess fracture union and signs of failure of fixation. Each patient's walking ability was recorded and compared with pre-injury walking ability using the Sahlstrand³ grading. Functional outcome was assessed based on the walking ability, post-operative pain, hip joint range of motion, and limb length shortening as excellent, good, fair, poor.

DYNAMIC HIPSCREW



A. Pre OP X-ray



B. Intra OP Picture



C. Immediate Post op Xray



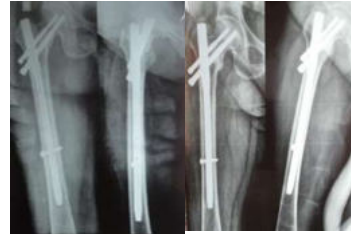
D. Six months Follow up

Proximal Femoral Nailing:

A. Pre OPX-ray



B. Intra op Picture



RESULTS:

The collected data was entered in Microsoft Excel-2019, which was used for generating charts and diagrams, etc. Data analysis was done by using SPSS Version-20 software (trial version).

The distribution of the study subjects based on gender concerning method of fixation, majority 64.3 % (9) females & 30% (3) males and 38.3 % (23) were in DHS group while in PFN group majority 58.3 % (7) were males & 41.6 % (5) were females, respectively. (Table 1)

Table-1 Sex Distribution

GENDER	METHOD OF FIXATION		Total
	DHS	PFN	
Male	3 (30%)	7 (58.33%)	10 (41.7%)
Female	9 (64.3%)	5 (41.66%)	14 (58.3%)
Total	12 (100%)	12 (100%)	24 (100%)

The distribution of the study subjects based on age group concerning the method of fixation in DHS group majority 66.7% (8) were in 61-80 years age group while in PFN group majority 58.3 % (7) were in 41-60 years age group, respectively.(Table 2)

Table-2 Age Distribution

AGE GROUP (years)	METHOD OF FIXATION		TOTAL
	DHS	PFN	
35- 40	1 (8.3%)	1 (8.3%)	2 (8.3%)
41- 60	1 (8.3%)	7 (58.3%)	8 (33.3%)
61- 80	8 (66.7%)	3 (25%)	11 (45.8%)
81- 100	2 (16.7%)	1 (8.3%)	3 (12.5%)
Total	12 (100%)	12 (100%)	24 (100%)
Mean ± S.D	71 ± 14	58 ± 11	64.4 ± 14.22

The distribution of the patients based on the mode of injury concerning the method of fixation, in the DHS group majority 75 % (9) had a trivial fall followed by 16.7 % (2) had RTA & 8.3 % (1) had fallen from a height, and in the PFN group, majority 66.7% (8) had trivial fall, followed by 16.7 % (2) had RTA & 16.7% (2) had fall from height. (Table 3)

Table-3 Based On Mode Of Injury

MODE OF INJURY	METHOD OF FIXATION		TOTAL
	DHS	PFN	
Fall from height	1 (8.33%)	2 (16.7%)	3 (12.5%)
RTA	2 (16.7%)	2 (16.7%)	4 (16.7%)
Trivial fall	9 (75%)	8 (66.7%)	17 (70.8%)
Total	12 (100%)	12 (100%)	24 (100%)

The distribution of the patients based on the side of injury, in the DHS group, majority 58.3 % (7) of patients had left-sided injury & 41.7% of patients had a right-sided injury while in the PFN group majority 58.3 % (7) of the patients had right-sided injury & 41.7 % (5) of the patients had left-sided injury.

In the DHS group, the mean duration of surgery was 95.83 min while in PFN group, the mean duration of surgery was 67.5 mins. There was an extreme statistically significant difference between both the methods

(p -value <0.05). Patients treated with PFN had significantly smaller skin incisions. Proximal femoral nailing required mean 28 minutes less operative time compared to the dynamic hip screw fixation. The mean blood loss was 345.83 ml while in PFN group, the mean blood loss was 137.5ml. There was an extreme statistically significant difference between both the methods (p -value <0.05). Patients treated with PFN had significantly less intraoperative blood loss compared to Dynamic hip screw fixation. In both DHS & PFN groups 8.3% (1) of the patients had wound infection; only in DHS group 8.3% (1) of the patients had screw cut-out / screw back out. In DHS group 183.4% (10) of the patients had no post-op complications while in PFN group 91.7% (11) of the patients had no post-op complications.

In the DHS group, the mean fracture union duration was 13.17 weeks while in PFN group, the mean fracture union duration was 12.17 weeks.

DISCUSSION:

The study's goal was to compare the functional outcome of intertrochanteric fractures treated with 2 different fixation devices, the intramedullary proximal femoral nail, and the extramedullary dynamic hip screw fixation. The present study consisted of 24 intertrochanteric fractures, out of which 12 were treated with DHS and 12 with PFN.

The age of the patient ranged from 36-92 years, with an average of 64.4 years. In the case of Dynamic hip Screw fixation, it was 71 years, and in cases of proximal femoral nailing, it was 58 years. All the fractures in patients younger than 60 were due to a road traffic accident or a fall from height.

This supports the bone stock plays an important role in the fracture causation of fractures among the elderly, that results in a trivial fall. White et al.⁵ studied the mortality rate for elderly patients after fracture of the hip in the 1980s and concluded that the average age for trochanteric fractures is 64.4 years. The average age in the present study nearly correlates to that of White et al. study.⁵

Our series consisted of 15 stable and nine unstable intertrochanteric fractures classified according to Jensen and Michealsen's modification of Evans classification⁶ and Boyd and Griffin classification³. The distribution of unstable or stable fractures in both groups were similar.

The incision length in the DHS group ranged from 14 cm to 18 cm, with a mean of 16.1 cm as compared to a mean of only 8.1 cm in the PFN group. A smaller incision in the PFN group meant that there was low intra operative blood loss. This was comparable to the study conducted by Baumgaertner et al.⁷

There was a mean duration of surgery in the DHS group was 95.83 minutes. The mean duration of surgery in the PFN group was 67.5 minutes. The difference in the operative duration in both groups was highly significant and attributed this difference to smaller incisions in the PFN group.

Baumgaertner et al.⁷ also reported that the surgical duration was 10 percent higher in the DHS group in their series.

In our series, one patient in the DHS group had wound infections compared to a single patient in the proximal femoral nail group, which was not statistically significant. All the wounds were only superficial wound infections and healed without any further surgical intervention. Saudan et al.⁸ study did not find any significant difference between the infection rates in the two groups in their series.

The shorter operative duration, smaller incisions, relatively less blood loss, and less post-operative pain with the PFN, which indicated the PFN has an advantage over the DHS even in treating stable intertrochanteric fractures where the functional outcomes are similar. Besides, with unstable intertrochanteric, the PFN has a definite advantage over the DHS in the earlier restoration of pre-injury walking ability, less limb length shortening, and a better overall functional outcome.

CONCLUSION:

In unstable intertrochanteric fractures, the proximal femoral nail has significantly had better outcomes in the earlier restoration of walking ability. Besides, as the proximal femoral nail requires a smaller

incision and shorter operative time, it has distinct advantages over dynamic hip screw even unstable intertrochanteric fractures. Hence, the proximal femoral nail may be the better fixation device for most intertrochanteric fractures.

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