

COMPARATIVE STUDY BETWEEN PROXIMAL FEMORAL NAILING AND DYNAMIC HIP SCREW IN THE MANAGEMENT OF INTERTROCHANTERIC FRACTURES OF FEMUR

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ABSTRACT: AIMS AND OBJECTIVES: To determine the rate of union, complications, operative risks and functional outcomes in intertrochanteric fractures treated with DHS and PFN, To compare the results obtained and To compare the effectiveness of DHS and PFN in treatment of intertrochanteric fractures. **RESULTS:** In the present series of 24 cases of Intertrochanteric fractures were treated by proximal femoral nailing and dynamic hip screw, 12 cases in each. Out of 24 there were 13 male and 11 female. Minimum age was 36 years, maximum age 76 years with mean age of 59.25 years. Slip and fall accounted for 75% of cases. BOYD and GRIFFIN type II fracture accounted for 58.3% of cases. Mean duration of hospital stay was 26 days in both PFN and DHS groups. Length of incision was small 5-6cm in PFN group compared to 10-12cm in DHS group. Mean external blood loss 150ml in PFN group and 315 ml in DHS group. Mean time for full weight bearing was 11.5 weeks for PFN group and 14.3 weeks for DHS group. Radiological union was 12.3 weeks in PFN group and 15.5 weeks in DHS group. Good to excellent results were seen in 91.7% of cases in PFN group and 75% in DHS group. **CONCLUSION:** From the study, we consider PFN as better alternative to DHS in the treatment of intertrochanteric fractures but is technically difficult procedure and requires more expertise compared to DHS. As learning curve of PFN procedure is steep, with experience gained from each case operative time, radiation exposure and intraoperative complications can be reduced in each case of PFN.

KEYWORDS: femur, subtrochanteric, intertrochanteric, proximal femoral nail, dynamic hip screw, sliding hip screw.

INTRODUCTION: Fractures of proximal femur and hip are relatively common injuries in elderly individuals, constituting 11.6% of total fractures. Of these intertrochanteric fractures constitute 53.4% with a female predominance (3:1).¹ Intertrochanteric fractures are commonly seen in patients over 60 years of age, mostly due to trivial trauma. Incidence has increased primarily due to increasing life span and more sedentary lifestyle brought by urbanization.

In elderly 90% of intertrochanteric fractures result from simple falls, of these pathological fractures constitute 1.3% of total fractures.² In younger population, Inter trochanteric fracture is usually the result of high- energy injury, such as motor vehicle accident or fall from height.

This group of fractures form sizeable portion of admissions to trauma ward, their management has created considerable interest in this century. Fortunately for these fractures union is not a problem due to abundant blood supply, cancellous nature of bone and a wide cross sectional area at fracture site³. All treatment modalities are aimed at preventing malunion and deformity.

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Internal fixation of the intertrochanteric fracture with early mobilization is considered as standard treatment. The only exception being a medically unstable patient, who has anaesthetic and surgical risk.

Though conservative treatment yields good results but necessitates prolonged immobilization of not less than two months duration with obvious economic implications, not to mention the pin tract problems and the ills of enforced bed rest in the elderly, viz: bed sores, deep vein thrombosis, fracture disease and pulmonary embolism. Another feature of conservative regime is the possibility of varus drift and shortening in spite of adequate period of immobilization. Therefore Surgery is the mainstay of treatment. The goal of treatment is fracture reduction so that near anatomic alignment and normal femoral anteversion are obtained.⁴

Various internal fixation implants are available which includes which can be broadly classified into intramedullary devices and extramedullary devices. Extramedullary device, such as a 95-degree lag screw and side plate or blade plate. Intra medullary fixation include devices like the IMHS (intra medullary hip screw), Gamma nail, Russell - Taylor reconstruction nail, ATN (Ante grade trochanteric nail), TFN (Trochanter fixation nail) and the PFN (Proximal femoral nail).

This study consists of 24 cases of intertrochanteric fractures, selected randomly and treated by PFN (intramedullary device) or DHS (extramedullary device) and comparison of their clinical outcome.

MATERIALS AND METHODS: The present study consists of 24 elderly patients with intertrochanteric fractures of femur who were treated with DHS or PFN in Department of Orthopaedics S.V.R.R.G.G.H, Tirupati during the period of Oct. 2010 to Sept. 2012.

This study was carried out to study the results of intertrochanteric fractures treated with DHS or PFN. All the 24 patients were followed up at regular interval. Inclusion Criteria included Adult Patients with Boyd and griffin type II, III, IV trochanteric fractures. Exclusion Criteria include, Open fractures, Pathological fractures, Pediatric fractures, Patients associated with polytrauma.

As soon as the patient with suspected Intertrochanteric fracture was seen, necessary clinical and radiological evaluation was done and admitted to ward after necessary resuscitation and splintage with either skin or skeletal traction. All the routine investigations were done as follows haemogram, blood urea, serum creatinine, urine routine, microscopy, blood sugar level, serum electrolytes, blood group, HIV, HBsAg, HCV, Chest X-ray and ECG. All the patients were evaluated for associated medical problems and were referred to respective department and treated accordingly. Associated injuries were evaluated and treated simultaneously. The patients were operated on selective basis after overcoming the avoidable anaesthetic risks.

End results were assessed based on Harris Hip Scoring System (Modified).⁴

RESULTS: The following observations were made from the data collected out of 24 cases of intertrochanteric fractures were selected randomly and treated by Proximal Femoral Nail or Dynamic Hip Screw in the Department of Orthopaedics in S. V. R. R. Government General Hospital, Tirupati from October 2010-October 2012.

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- 1. AGE AND SEX DISTRIBUTION:** In our study maximum age was 76 years and minimum age was 36 years. Most of the patients were between 50- 80 years. Mean age was 59.25 years. There were 13 male (54%) and 11 female patients (46%).
- 2. NATURE OF INJURY:** Most of cases were result of slip and fall, Slip and Fall: 18(75%), Fall from height: 3(12.5%), RTA: 3(12.5%).
- 3. SIDE AFFECTED:** Right hip was involved in 14 cases (58.4%), left involved in 10 cases (41.6%).
- 4. TYPE OF FRACTURE:** Trochanteric fractures are classified according to BOYD AND GRIFFIN CLASSIFICATION. Our study included no type 1 fracture.

Type of Fracture	Number of Cases		Percentage	
	PFN	DHS	PFN	DHS
Type 2	5	9	20.8%	37.5%
Type 3	4	3	16.7%	12.5%
Type 4	3	0	12.5%	0
Total	12	12	50%	50%

Table 1

- 5. ASSOCIATED INJURIES:** Associated injuries included head injury, distal radius fracture, clavicle fracture

Two patients (1among DHS 1 among PFN group) had closed head injury. CT brain study impression normal report and were managed conservatively.

Three patients (2 among DHS and 1 among PFN group) had distal radius fracture. Two of them treated conservatively with reduction and below elbow cast application and one (among DHS group) was treated with open reduction and internal fixation with locking compression plate. One had ipsilateral clavicle fracture (among DHS group) and was treated conservatively.

Nature of Injury	No. of Cases	
	DHS Group	PFN Group
Head Injury	1	1
Distal Radius Fracture	2	1
Clavicle Fracture	1	0

Table 2

- 6. TIME OF SURGERY:** All the patients were operated at an average interval of 10.9 days from the day of trauma.
- 7. INTRA OPERATIVE DETAILS:** Blood loss was measured by mop count (each fully soaked mop contain 50ml of blood) and collection in suction. External blood loss was more for DHS compared to PFN and in PFN there was more blood loss where open reduction was

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performed in one reverse oblique displaced fracture in which failure to obtain closed reduction.

Other intra operative details are illustrated in table;

INTRAOPERATIVE DETAILS	DHS	PFN	p value
Mean Radiographic Exposure (no of times)	30	45	<0.01 (Significant)
Mean Duration of Operation (in minutes)	80	100	<0.01 (Significant)
Mean Blood loss (in milli litres)	315	150	<0.02 (Significant)

Table 3

8. INTRA OPERATIVE COMPLICATIONS:

Intra operative complications included with DHS.

Complications	Number of cases	Percentage
Varus angulation	2	16.6%

Table 4

Intra operative complications included with PFN.

Complications	Number of cases	Percentage
Failure to achieve closed reduction	1	8.3%
Fracture of lateral cortex	1	8.3%

Table 5

In our study there was difficulty in achieving closed reduction in one case of displaced and reverse oblique fracture, where open reduction was done. There was iatrogenic fracture of the lateral cortex of proximal fragment in 1 out of 12 cases of PFN. This was occurred in initial case probably due to wrong entry point and osteoporotic bone.

We had no difficulties in distal locking. All the cases were locked distally with at least one locking bolt. There were no instances of drill bit breakage or jamming of nail.

9. INFECTION: Post-operative complications included one case superficial infection among the DHS patients. No deep infection in either group.

10. DELAYED COMPLICATIONS: DELAYED COMPLICATION AMONG DHS GROUP.

Complications	Number of cases	Percentage
Shortening of >1cm	2	16.7%
Varus Malunion	2	16.7%
Persistent hip pain	2	16.7%

Table 6

There were no cases of non-union. There were no cases of hip and knee joint stiffness.

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DELAYED COMPLICATION AMONG PFN GROUP:

Complications	Number of cases	Percentage
Hip stiffness	1	5%
Knee stiffness	0	0%
Shortening of >1cm	1	8.3%
Varus Malunion	1	8.3%
Persistent hip pain	1	8.3%

Table 7

There were no cases of screw cutout & nail breakage. There was no case of femoral shaft fracture or non-union or implant failure.

11. DURATION OF HOSPITAL STAY: In our study the average duration of hospital stay was 26 days for PFN patients and 26.16 days for DHS patients. The mean time of full weight bearing was 11.91 weeks for PFN and 14.25 weeks for DHS. All patients enjoyed good, hip and knee range of motion except for 1 patient of PFN who had extensive lateral cortex comminution during surgery and had to be immobilized for prolonged period resulting in hip stiffness.

	PFN	DHS	'p' value
Mean duration of Hospital stay (in days)	26	26.16	0.8 (Not Significant)
Mean time for full weight bearing (in weeks)	11.91	14.25	<0.001 (Significant)

Table 8

12. RADIOLOGICAL UNION: Time to healing, defined as the time of the formation or circumferential bridging callus across the fractures. The average time of healing was;
In PFN -12.25 Weeks.
In DHS -14.3 Weeks.

With 'p' value <0.001 (Significant), patients treated with PFN showed better radiological outcome when compared to those treated with DHS.

13. ANATOMICAL OUTCOME: Anatomical results were assessed by shortening, hip and knee range of movements and varus deformity.

Anatomical Result	Number of cases	
	PFN	DHS
Shortening more than 1cm	1	2
Varus deformity	1	2
Restriction of Hip movement	1	0
Restriction of Knee movement	0	0

Table 9

With 'p' value 0.4 (Not Significant), no difference was made out in either group.

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14. FUNCTIONAL OUTCOME: Interpretation of functional results of DHS&PFN based on modified Harris hip score.

Functional Results	Number of cases		Percentage	
	DHS	PFN	DHS	PFN
Excellent	7	8	58.3%	66.7%
Good	2	3	16.7%	25%
Fair	3	1	25%	8.3%
Poor	0	0	0%	0%

Table 10

'p' value 0.5 (Not Significant), no significant difference was seen in functional outcome in either group.

15. FUNCTIONAL RESULTS WITH REGARD TO TYPE OF FRACTURE:

TYPE OF FRACTURE	EXCELLENT		GOOD		FAIR	
	DHS	PFN	DHS	PFN	DHS	PFN
TYPE II	7	5	1	-	1	-
TYPE III	-	2	1	2	2	-
TYPE IV	-	1	-	1	-	1

Table 11

Good to excellent results were seen in 91.7% of cases in PFN group and 75% in DHS group.

DISCUSSION: The development of the dynamic hip screw in the 1960's saw a revolution in the management of unstable fractures. The device allowed compression of the fracture site without complications of screw cut-out and implant breakage associated with a nail plate.⁵⁻⁸ However, the extensive surgical dissection, blood loss and surgical time required for this procedure often made it a contraindication in the elderly with co-morbidities. The implant also failed to give good results in extremely unstable and the reverse oblique fracture.

In 1996 the AO/ASIF developed the proximal femoral nail (PFN) as an intramedullary device for the treatment of unstable per-, intra- and subtrochanteric femoral fractures in order to overcome the deficiencies of the extramedullary fixation of these fractures. This nailing as the following advantages compared to extramedullary implant-such as decreasing the moment arm, can be inserting by closed technique, which retains the fracture haematoma an important consideration in fracture healing, decreasing blood loss, infection, minimizing the soft tissue dissection and wound complications.⁹ In a clinical multicenter study, authors reported technical failures of the PFN after poor reduction, malrotation or wrong choice of screws.⁹

In our series of 24 cases of Intertrochanteric fractures, treated by proximal femoral nailing and dynamic hip screw, 12 cases in each. Out of 24 there were 13 male and 11 female. Minimum age was 36 year, maximum age 76 year with mean age of 59.25 year. Slip and fall accounted for 75% of cases. Right side was more common, accounted for 58.4% of cases. BOYD and GRIFFIN

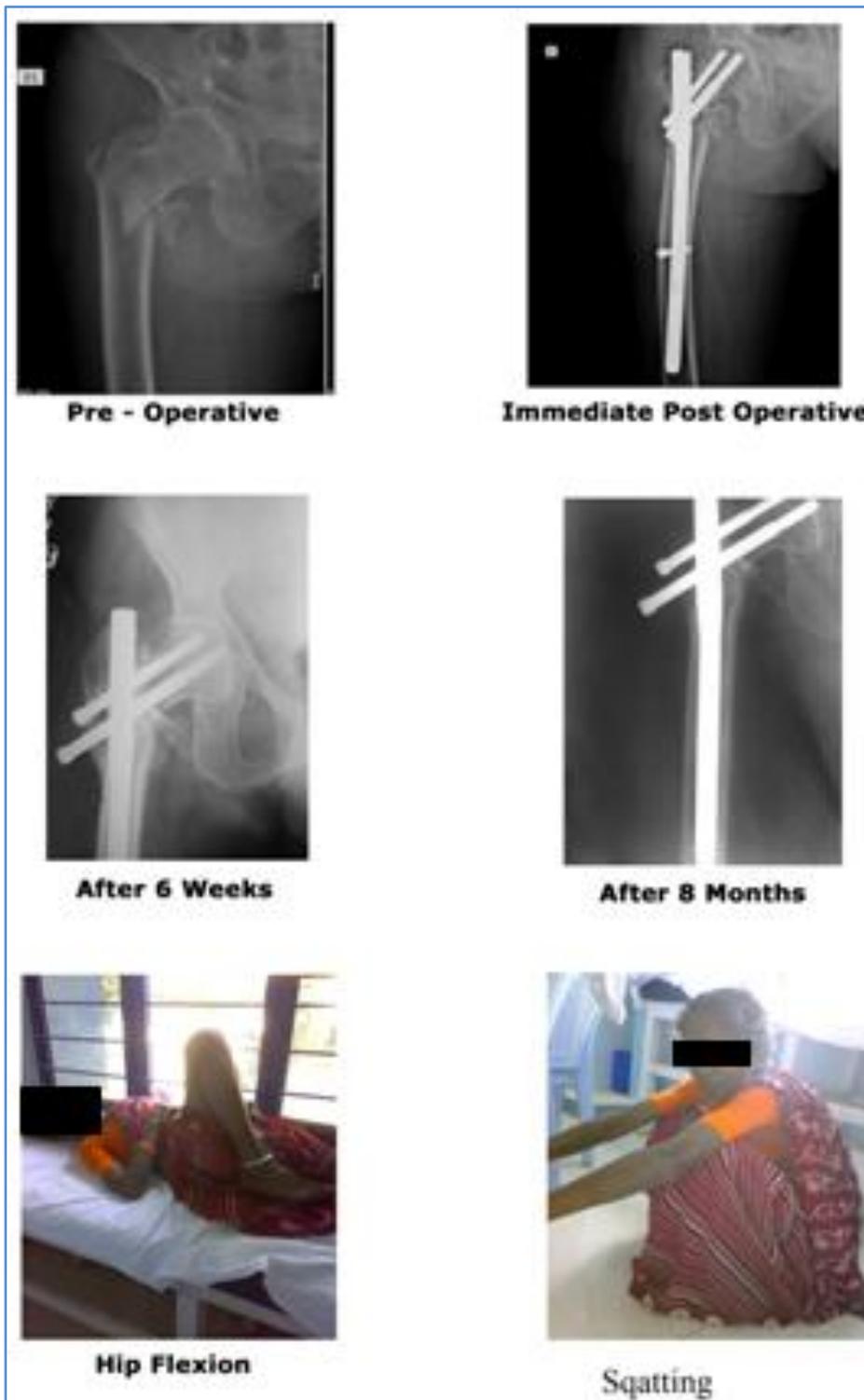
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type II fracture accounted for 58.3% of cases. Mean duration of hospital stay was 26 days in both PFN and DHS groups. Length of incision was small 5-6cm in PFN group compared to 10-12cm in DHS group. Mean external blood loss 150ml in PFN group and 315 ml in DHS group. Mean time for full weight bearing was 11.91 weeks for PFN group and 14.3 weeks for DHS group. Radiological union was 12.3 weeks in PFN group and 15.5 weeks in DHS group. Good to excellent results were seen in 91.7% of cases in PFN group and 75% in DHS group.

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CASE 1



Pre - Operative



After 6 Weeks



After 6 Months



Squatting



Sitting Cross Leg



Hip Flexion

CASE 2

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