



ISSN (P): 2521-3466
ISSN (E): 2521-3474
© Clinical Orthopaedics
www.orthoresearchjournal.com
2019; 3(3): 01-07
Received: 01-05-2019
Accepted: 05-06-2019

Dr. K Harish
Consultant Orthopaedic Surgeon,
Srikara Hospitals, Vijayawada,
Andhra Pradesh, India

Dr. Sravya Teja Paleti
Assistant Professor, Department
of Orthopaedics, Asram Medical
College, Eluru, Andhra Pradesh,
India

Dr. R Naresh Kumar
Consultant Orthopaedic surgeon,
Vijayawada, Andhra Pradesh,
India

A comparative study between DHS and PFN for the treatment of IT fractures

Dr. K Harish, Dr. Sravya Teja Paleti, and Dr. R Naresh Kumar

DOI: <https://doi.org/10.33545/orthor.2019.v3.i3a.01>

Abstract

Background: Intertrochanteric fractures are one of the common fractures. Intertrochanteric and per trochanteric are generic terms for per trochanteric fractures. The incidence of intertrochanteric fractures is gender and race dependent and varies from country to country. Ninety percent of intertrochanteric fractures in the elderly result from a simple fall & Intertrochanteric fractures in younger individuals are usually the result of a high-energy injury. Implants for fixation for intertrochanteric fractures are broadly divided into 1. Extramedullary devices, ex:- Dynamic hip Screw (DHS) 2. Intramedullary devices ex: - proximal femoral nail (PFN). Now a controversy has arisen about the ideal implant for fixation of intertrochanteric fractures i.e DHS or PFN. In view of these conditions, this study is taken up to compare the results of DHS and PFN in the management of intertrochanteric fracture.

Aims & 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 between DHS and PFN.

Patients and Methods: The present STUDY has been conducted at King George hospital, Visakhapatnam during the period between September 2013 and August 2015. Thirty patients with intertrochanteric fractures treated with dynamic HIP SCREW & PROXIMAL FEMORAL NAILING fixation were selected for the present study.

Observation and Results: The patients are evaluated based on intra operative and post operative complications, duration of surgery, post-operative functional and anatomical results and time of complete weight bearing.

Conclusion: From the study, we consider PFN as a better alternative to DHS in the treatment of intertrochanteric fractures but is a technically difficult procedure and requires more expertise compared to DHS. With experience gained from each case operative time, radiation exposure, blood loss and intraoperative complications can be reduced in case of PFN.

Keywords: Intertrochanteric fractures, DHS, PFN

Introduction

Intertrochanteric and per trochanteric are generic terms for per trochanteric fractures. The incidence of intertrochanteric fractures is gender and race dependent and varies from country to country. Ninety percent of intertrochanteric fractures in the elderly result from a simple fall & Intertrochanteric fractures in younger individuals are usually the result of a high-energy injury.

Rigid internal fixation and early mobilization has been the standard method of treatment. Implants for the fixation of intertrochanteric fractures can broadly be divided into 1. Extramedullary devices, ex:-DHS 2. Intramedullary devices ex: - PFN. The latest implant for management of intertrochanteric fracture is PFN. A proximal femoral nail was designed by AO-ASIF group in 1997 for the treatment of proximal femoral fractures^[1]. Now a controversy has arisen about the ideal implant for fixation of intertrochanteric fractures i.e DHS or PFN.

In view of these conditions, this study is taken up to compare the results of DHS and PFN in the management of intertrochanteric fracture.

Correspondence

Dr. Sravya Teja Paleti
Assistant Professor, Department
of Orthopaedics, Asram Medical
College, Eluru, Andhra Pradesh,
India

Aims & 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 between DHS and PFN.

Patients and Methods

The present study has been conducted at King George hospital, Visakhapatnam during the period between September 2013 and August 2015. Thirty 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 King George Hospital, Visakhapatnam 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. 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

Patient positioning

Use of fracture table allows good roentgen graphic control and enables manipulation of leg, with patient lying in supine position.

Prepare the skin over the hip and square off the lateral aspect of the hip from the iliac crest to the distal thigh with towels and drapes. Drape the C-arm separately.

Reduction of fracture

After positioning the anaesthetized patient supine on the fracture table, taking care to avoid undue pressure or tension on any part of the body. Closed reduction of fracture is performed, generally obtained with traction in neutral or slight external rotation. The reduction is checked by anteroposterior and lateral views under image intensifier with special attention to cortical contact postero-medially.

Exposure

Mid lateral incision is done a little distal to the tip of greater trochanter along the shaft of the femur to the extent needed for fixation of implant. After splitting the fascia-lata, the vastus laterals is cut along the attachment of the muscle to the femur using L shaped incision. A periosteal elevation is used to clear the lateral surface of proximal femur.

Insertion of guide PIN

With the 135 degrees angle guide, under image intensifier, the guide pin inserted 2cm below the flare of the greater trochanter,

midway between the anterior and posterior cortices. The guide pin should be in the center or inferior, in anteroposterior x – ray and in center or slightly posterior in lateral x-ray. The length of the guide pin lying outside the bone is measured for depth calculation.

Reaming of the femur

The triple reamer, which serves the function of reaming for the screw (8mm) and barrel (13mm) and for the barrel plate junction. Reaming is performed around the guide pin until the correct depth is reached.

Derotation screw

In unstable trochanteric fractures, an additional stabilizing pin may be used to prevent rotation of proximal fragment during insertion of the lag screw.

Tapping of the femur

With a screw lock tap to facilitate the setting of lag screw especially in young patients within firm cancellous bone. In osteoporosis bone tap 1-2 cm less to allow the screw to engage firmly into the sub articular bone.

Insertion of lag screw and plate

The correct length of lag screw is determined with the measuring gauge. This measurement allows for 5 mm of compression. If more compression is desired, a shorter screw is used the appropriate plate and lag screw are assembled onto the insertion wrench and inserted into the reamed hole over the guide wire. The centering sleeve is removed and the side plate is advanced onto the lag screw. The plate is then clamped to the femur and then fixed securely. The compression screw must be left in place to prevent disengagement of screw plate assembly. The wound is finally closed in layers over a suction drainage system after securing homeostasis.

Tip apex distance

It is the distance between the tip of the lag screw and subchondral bone of centre of the femoral head in both A.P & lateral views. Normally it should be < 25 mm.



Fig 1: Implants and Instruments for dynamic HIP screw fixation

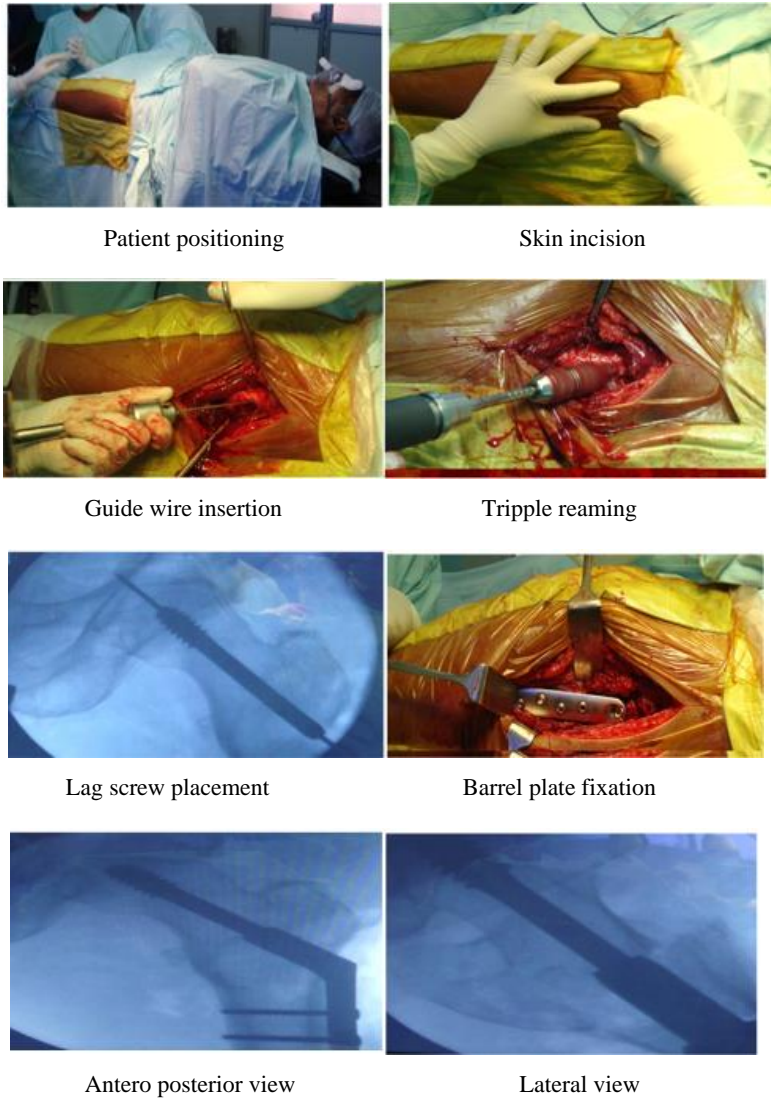


Fig 2: Intra op pictures of DHS

Proximal femoral nail system



Fig 3: Implants and Instruments for proximal femoral nailing

Operative procedure

Patient positioning

Patient lying supine on Albee's fracture table allows good roentgen graphic control and enable manipulation of leg and application of traction.

Reduction of fracture

After positioning the anaesthetised patient supine on fracture table, taking care to avoid undue pressure or tension on any part of the body, closed reduction of fracture is performed. The Uninjured limb is held in well leg holder so that it remains out of the way by putting it in 90 – 90 ° leg holder. Reduction is achieved by aligning distal fragment to flex and externally rotated proximal fragment by rotating the foot of effected extremity.

Procedure

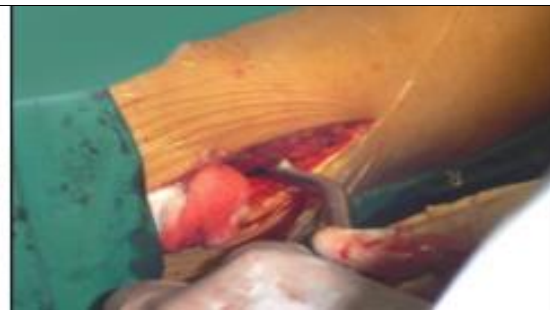
A Slightly curved lateral incision is made from the level of trochanter proximally for about 6 to 9cm. The length of incision varies with the size of the patient. Under fluoroscopic guidance, a 3.2mm pin is inserted into the tip of greater trochanter, taking care to centre it on both antero posterior and lateral views. The pin is then driven 5cm into proximal femur. An alternative to this method is to use an awl, under fluoroscopic guidance to provide the opening. The awl should be inserted up to the point

of largest outer diameter under fluoroscopic guidance and then removed. A guide wire is then inserted into proximal fragment. The 9mm end cutting reamer is used above fracture site after the position of guide wire is verified by fluoroscopy. The cannulated manipulator for proximal fragment is then introduced over guide wire. Using the cannulated manipulator fracture is reduced and guide wire is passed into distal fragment. Now distal fragment is reamed with 9mm reamer.

The reaming process is continued at 0.5 mm increments until 1mm more than the selected nail size is reached and the proximal fragment entry point is widened with entry point widener. The selected nail is then assembled to jig and passed over the guide wire and pushed manually by rocking movements and the terminal position is hammered to the desired level and anteversion is adjusted by comparing with opposite hip or setting the anteversion of 15°. Skin is marked opposite to inferior hole of drill guide. Skin, fascia are incised and drill sleeves are inserted until they reach lateral femoral cortex and checked by image intensifier. Now a 3.2mm guide pin is inserted through inferior drill sleeves and checked under image intensifier so that it should be 4mm above the calcar and inferior in the neck. If not the position of nail is adjusted. Now sleeves are placed in proximal hole and guide pin is inserted and the final position of guide pins is checked under image intensifier before drilling.



Patient Positioning



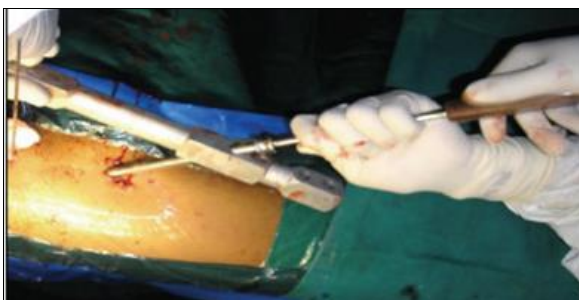
Entry Point



Reaming of entry point over guide wire



Drilling on guide wire for neck screw



Insertion of anti-rotation % crew



Insertion or distal locking

Fig 4: Intra op pictures of PFN

Observation and Results

The results of the treatment of intertrochanteric fractures using Proximal Femoral Nail AO type were assessed by HARRIS HIP SCORE system. This system is slightly modified according to the needs of the Indian patients. I e. in place of “put on shoes and socks” we have used “squatting” and in place of “sitting” we have used “cross legged sitting”

Harris HIP evaluation (Modified) [2].

1. Pain

- None or ignores the pain
- Slight, Occasional, no compromise in activities
- Mild pain, no effect on average activities, Rarely moderate pain with unusual activity, may take aspirin
- Moderate pain, tolerable but makes concessions to pain
- Totally disabled, crippled, pain in bed, bedridden

2. Limp

- None
- Slight
- Moderate
- Severe

3. Support

- None
- Cane for long walks
- Cane most of the time
- One crutch
- Two canes
- Two crutches
- Not able to walk

4. Distance walked

- Unlimited
- Six blocks
- Two or Three blocks
- Indoors only
- Bed to chair

5. Stairs

- Normally without using a railing
- Normally with a railing
- In any manner
- Un able to do stairs

6. Squatting

- With ease
- With difficulty
- Unable

7. Cross legged sitting

- With ease
- With difficulty
- Unable

8. Enter public transportation

- Yes
- No

9. Flexion contracture _____ (Degrees)

Leg length discrepancy _____ (Cms)

Absence of all Deformities (All yes = 4, less than 4 =0)

- Less than 30 fixed flexion contracture Yes No

- Less than 10 fixed adduction Yes No
- Less than 10 fixed internal rotation in extension Yes No
- Leg length discrepancy less than 3.2 cm Yes No

10. Range of motion (In degrees)

- Flexion
- Adduction
- Abduction
- External rotation
- Internal rotation

Range of Motion Scale

- 211-300
- 161-210
- 101-160
- 61-100
- 31-60
- 0-30

Range of Motion Score _____

Total Harris HIP Score _____

Result

- 0 -69 Poor
- 70-79 Fair
- 80-89 Good
- 90-100 Excellent

Trochanteric fractures are classified according to Boyd and Griffin Classification [3].

Table 1: Type of fractures

Type of fracture	No. of cases	Percentage
Type 1	9	30
Type 2	16	53.3
Type 3	5	16.6
Type 4	--	--
Total	30	

Intraoperative details

Table 2: Intra-operative details

Intraoperative Details	PFN	DHS
Mean radiographic exposure (No of times)	70	40
Mean duration of operation (In minutes)	100	80
Mean blood loss (In milli litres)	240	320

Intraoperative complications of DHS

Table 3: Intraoperative complications of DHS.

Complications	Number of cases	Percentage
Improper positioning of Richard screw	5	16.66%
Varus angulation	3	9.99%
Drill bit breakage	1	3.33%

There were comparatively minimal intraoperative complications encountered during DHS fixation. Reduction was comparatively easier as open reduction was performed in all the cases. However difficulties in reduction were encountered in cases that were delayed and in case of comminuted fractures.

Intraoperative complications of PFN

Table 4: Intraoperative Complications of PFN.

Complications	Number of cases	Percentage
Failure to achieve closed reduction	7	23.33%
Fracture of lateral cortex	3	9.99%
Fracture displacement by nail insertion	3	9.99%
Failure to put derotation screw	4	13.33%

Delayed complications

Table 5: Delayed Complication-DHS

Complications	Number of cases	Percentage
Hip stiffness	0	0%
Knee stiffness	0	0%
Non union	0	0%
Shortening of >1cm	1	3.33%
Varus malunion	1	3.33%
Implant failure	2	6.66%

Table 6: Delayed Complications-PFN

Complications	Number of cases	Percentage
Hip stiffness	1	3.33%
Knee stiffness	1	3.33%
Non union	0	0%
Shortening of >1cm	2	6.66%
Varus malunion	2	6.66%
Implant failure	0	0%

Analysis

Table 7: Assessment of Results

	P.F.N	D.H.S
Mean time for full weight bearing (in weeks)	10.6	14.8
Mobility after surgery (6 weeks post-operatively)		
Independent	9	7
Aided	3	5
Non-ambulatory	1	0
Mean range of movements (6weeks post-operatively)		
Hip joint (0-110 degrees)	12/13	12/12
Knee joint (0-120 degrees)	12/13	12/12

Follow-Up

All patients were followed up at 2 weeks interval till fracture union, at 12 weeks & at 6 months post operatively. 5 patients failed to attend the first follow up & were lost for further follow up (3 cases of DHS and 2 PFN). At each follow up radiographs of upper femur and hip were taken to assess the fracture union, implant failure & screw cut out.

Anatomical Results

Anatomical results were assessed by shortening, hip and knee range of movements and Varus deformity.

Table 8: Anatomical Results

Anatomical result	Number of cases	
	PFN	DHS
Shortening >1cm	2	1
Varus deformity	2	1
Restriction of hip movement	1	4
Restriction of knee movement	1	0

Functional results

In our series of 30 patients 5 cases were lost for follow up and 2 cases expired due to associated medical problems. Functional and Anatomical results were assessed by taking the remaining 23 cases into consideration.

PFN-11 DHS-12

Table 9: Interpretation of functional results of DHS

Functional Results	Number of cases	Percentage
Excellent	6	50%
Good	2	13.33%
Fair	2	13.33%
Poor	2	13.33%

Table 10: Interpretation of functional results of PFN

Functional Results	Number of cases	Percentage
Excellent	8	72.73%
Good	1	9.1%
Fair	1	9.1%
Poor	1	9.1%

Discussion

The treatment of intertrochanteric fracture is still associated with some failures. High stress concentration that is subject to multiple deforming forces, high incidence of complications reported after surgical treatment, compels the surgeon to give a second thought regarding selection of proper implant. DHS is the most commonly used method of fixation is sliding screw system.

PFN is developed by The AO ASIF in 1996, with an antirotation hip pin together with a smaller distal shaft diameter which reduces stress concentration to avoid failures. From mechanical point of view an intramedullary device inserted by means of minimally invasive procedure seems to be better in elderly patients. Closed reduction preserves the fracture hematoma, an essential element in consolidation process. Intramedullary fixation allows the surgeon to minimize soft tissue dissection, thereby reducing surgical trauma, blood loss, and infection and wound complications.

In our study, intertrochanteric fracture was common due to slip & fall, age ranged between 60 to 100 years, mean age of 67.3 years. Females were common, contributing to 63.3%. Right sided fractures were common accounting for 70%. Type II Boyd and Griffin fractures were common, consisted of 53.3%. Type I and Type III were 30% and 16.6% respectively. Mean frequency of radiation exposure was 70 and 40 times, mean duration of operation was 100 and 80 minutes, mean blood loss was 240 ml and 320 ml for PFN and DHS respectively.

Intraoperatively

Among DHS, intraoperatively we had fewer complications which included improper placement of the screw in 5 cases, Varus angulation in 3 cases, drill bit breakage in 1 case. Among PFN, 7 cases had to undergo open reduction, iatrogenic fracture of lateral cortex was seen in 3 cases, and 3 cases fracture got displaced by nail insertion, 4 cases anti-rotation screw could not be placed.

Post operatively

1 case of PFN had wound infection and none of the DHS cases got infected. Mean time of full weight bearing was 10.6 weeks and 14.8 weeks in PFN and DHS respectively. All patients were

mobile at the end of 6 weeks with or without walking aid except for one case of PFN. 9/13 and 7/12 cases of PFN and DHS had independent mobility.

Follow UP

In our 30 cases, 5 patients were lost for follow up and 2 cases expired due to associated medical problems.

Excellent results were seen in 50% and 72.73%, Good in 13.33% and 9.1% cases of DHS and PFN respectively.

Conclusion

In the present study of 30 patients of intertrochanteric fractures, 15 cases were treated with PFN and 15 cases with DHS. This study is done to compare the results of surgical management of intertrochanteric fractures with Proximal Femoral Nail and Dynamic Hip Screw. The data was assessed, analyzed, evaluated and following conclusions were made.

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. With experience gained from each case operative time, radiation exposure, blood loss and intraoperative complications can be reduced in case of PFN.

References

1. The AO/ASIF proximal femoral nail (PFN) for the treatment of unstable trochanteric femoral fracture. *Injury*. 2002; 33:395-399.
2. Harris hip score; Harris WH; (modified) *JBJS*. 1969; 51:1.
3. Boyd and griffin: classification and treatment of trochanteric fractures; *arch surg*. 1949; 58; 853-866.