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## Clinical, functional and radiological outcome of unstable intertrochanteric femur fracture treated with proximal femur nail

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### Abstract

**Objective:** To determine the clinical, functional and radiological outcome of unstable intertrochanteric femur fractures treated with proximal femur nail

**Methods:** The study is a prospective study on 20 patients to analyse clinical, functional and radiological outcome of unstable intertrochanteric femur fractures treated with proximal femur nail conducted in the Department of Orthopedics at Stanley medical college, Chennai from June 2018 to August 2020. Functional outcome was assessed using Harris hip score.

**Results:** 20 patients of unstable intertrochanteric fracture were treated surgically with proximal femur nail and the results were functionally and radiologically analysed. Patients were followed up from 11months to 22 months and mean follow up in months was  $15.9 \pm 2.73$ . Mean Harris hip space at 3months was  $73.85 \pm 3.4$ , Mean Harris hip score at 6months was  $85.15 \pm 2.66$ . Radiological Fracture union was noted between 12-16 weeks and mean time for union was  $12.90 \pm 1.4$  weeks

**Conclusion:** Intramedullary nailing with the PFN has distinct advantages over DHS like shorter operating time and lesser blood loss for unstable trochanteric fractures. Early mobilization and weight bearing is allowed in patients treated with PFN thereby decreasing the incidence of bedsores, uraemia and hypostatic pneumonia. The incidence of pre-operative and postoperative planning and correct technique, adequate reaming of femoral canal, insertion by hand and meticulous placement of distal locking screws. PFN is a significant advancement in the treatment of unstable trochanteric fractures which has the unique advantage of closed reduction, preservation of fracture haematoma, less tissue damage during surgery, early rehabilitation and early return to work.

**Keywords:** PFN thereby, reduction, preservation

### Introduction

Intertrochanteric femur fracture is most frequently seen among aged patients with underlined osteoporosis. Management and treatment of intertrochanteric femur fracture includes surgically fixing the fracture, which is the most accepted method to gain reduction and early mobilization. Review of literature shows that intramedullary nailing is one of the best option for surgical fixation and has better clinical outcomes.

Intertrochanteric fracture are characterized as extra capsular fracture of the proximal femur that happen between the greater and lesser trochanter. The intertrochanteric part of the femur is situated between the greater and lesser trochanters and is made out of thick trabecular bone. The greater trochanter fills in as an addition site for the gluteus medius, gluteus minimums, obturator internes, piriformis, and site of starting point for the vastus lateralis. The lesser trochanter fills in as an inclusion site for the iliacus and psoas major, regularly alluded to as the iliopsoas. The calcar femorale is the vertical mass of thick bone that reaches out from the posteromedial part of the femur shaft to the back side of the femoral neck. This structure is significant on the grounds that it decides if a fracture is steady. The huge metaphyseal region has a more plentiful blood supply, contributing to a higher union rate and less osteonecrosis compared to femoral neck fractures.

Intertrochanteric fracture in grown-ups are the consequences of high energy injury like fall or street road traffic accident interestingly, 90% of fracture happening in the old people are because of a basic fall.

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The inclination to fall increments with age and is exacerbated by a few elements like helpless vision, changed blood pressure, poor reflexes, diminished muscle power, vascular sickness and coinciding musculoskeletal pathology. Thus this study was conducted with the aim to study clinical, functional and radiological outcome of unstable intertrochanteric femur fracture treated with proximal femur nail.

## Materials and Methods

Study Design is a Hospital based prospective study and was carried out in Government Stanley Medical College & Hospital, Chennai, 20 patients operated during June 2018 – august 2020 were considered for the study. All cases presenting to the hospital who have given consent and fulfilling the below mentioned criteria.

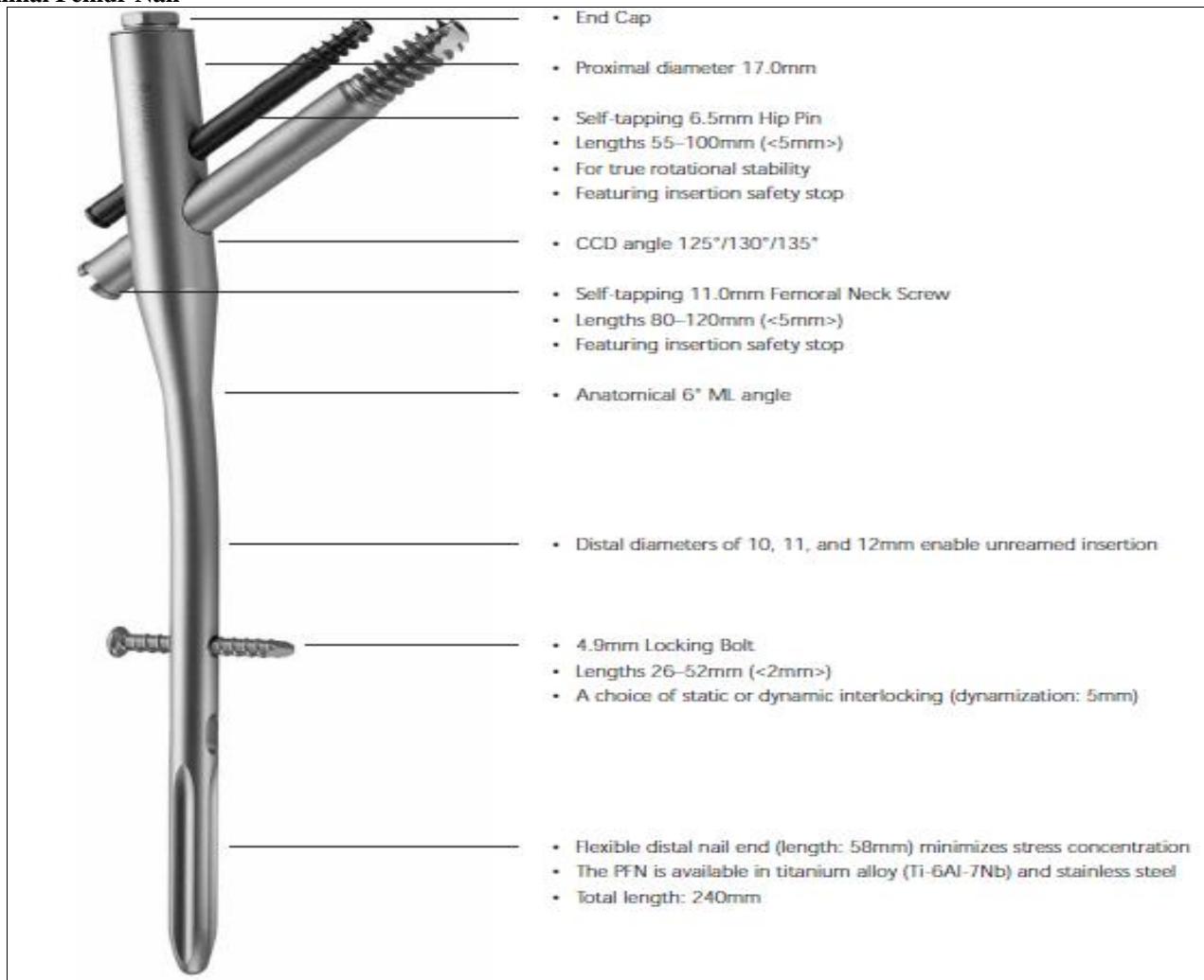
### Inclusion criteria

- Patients aged above 20 years.
- Closed fracture
- Unstable intertrochanteric femur fracture type II, III, IV.

### Exclusion Criteria

- Patients aged less than 20 years.
- Open fractures

## Proximal Femur Nail



### Steps for proximal femoral nail insertion

- Patient to be in supine position on operating table.
- To Position the image intensifier so that it can envisage

- Pathological fracture

Patients subjected to surgery were followed up at 3 months and 6 months with clinical and radiological data. Assessment was done based on a proforma containing all necessary information regarding.

- Personal details: age, sex, address and occupation
- Type of fracture: unstable intertrochanteric femur fracture.
- Surgical procedure carried out
- Duration of hospital stay
- Initiation of mobilization
- Physiotherapy
- Range of movements achieved post operatively by way of periodic follow up.
- Patient will be evaluated by both clinically, functionally and radiologically.
- Clinical examination will be evaluated with HARRIS Hip score. The corresponding hip score will be entered against all the parameters mentioned in the hip score proforma.

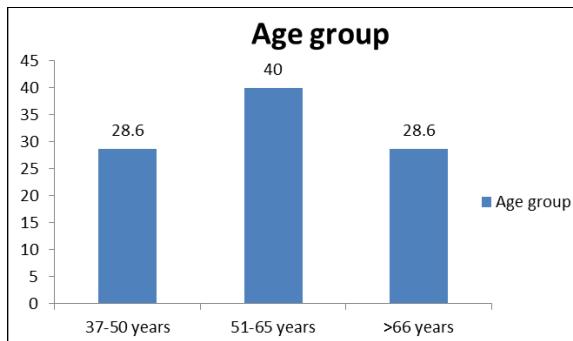
The maximum hip score is 100 points, 90-100 excellent, 80-89 good, 70-79 fair, <70 poor results.

medullary cavity.

- AP X-ray to be taken of the unaffected side preoperatively. Determine the CCD angle using a goniometer or the preoperative planning.
- Closed reduction should be tried if possible.
- Determine the distal nail diameter by placing the AO/ASIF planning template.
- Determine nail insertion point and insert Guide Wire (Medial trochanteric entry)
- Opening of the femur 17.0mm Drill Bit over the guide wire through the protection sleeve 20.0/17.0
- Nail is inserted carefully and manually as far as possible into the femoral opening.
- Insertion of femoral neck screw and hip pin
- Insertion of guide wire for femoral neck screw
- Insertion of guide wire for hip pin
- Insertion of the hip pin to prevent possible rotation of the medial fragment when inserting the femoral neck screw.
- Measuring length of femoral neck screw
- Hole is drilled for distal locking
- Locking bolt is inserted
- End Cap is inserted

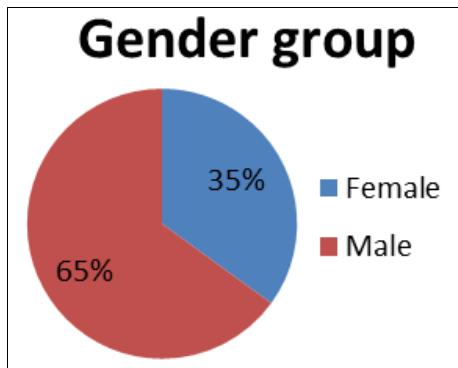


## Results



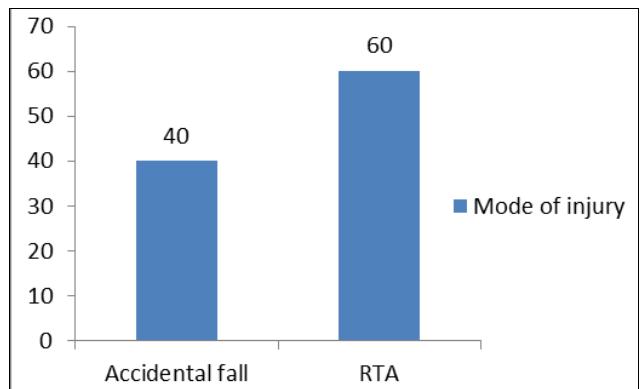
**Fig 1:** Age group wise distribution of the study participants

Fig 1 shows age group wise distribution of the study participants. Results of the study showed that majority if the participants were in the age group of 51-65 years (40%), followed by 37- 50 years (28.6%)



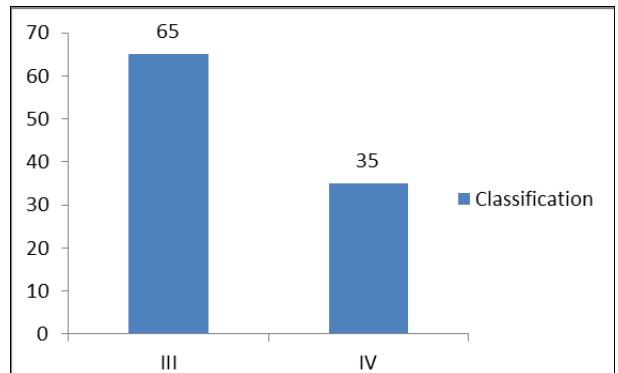
**Fig 2:** Gender wise distribution of the study participants

Fig 2 shows gender wise distribution of the study participants. Results of the study showed that majority if the participants were male (65%) and 35% were female participants.



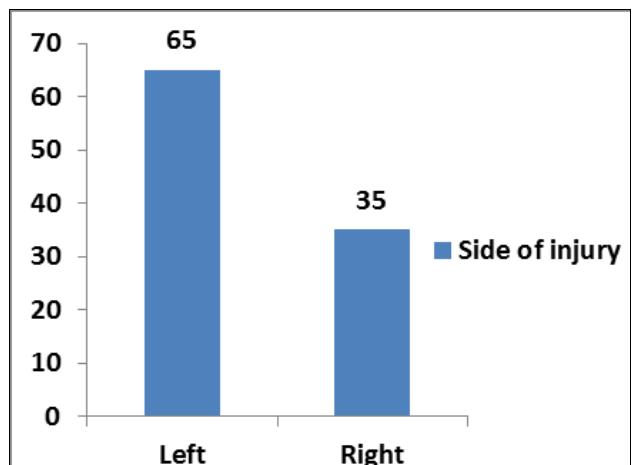
**Fig 3:** Mode of injury

Fig 3 shows mode of injury. Results of the study showed that majority had road traffic accident (60%) and 40% had accidental fall.



**Fig 4:** Classification

Fig 4 shows classification. Results of the study showed that majority of the participants fell in stage III (65%) and 35% had stage IV.



**Fig 5:** Side of injury

Fig 5 shows side of injury. Results of the study showed that majority of the participants had injury on left side (65%) and 35% on right side.

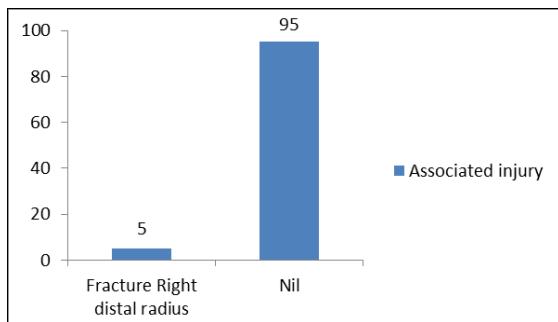
**Fig 6:** Associated injury

Fig 6 shows associated injury. Results of the study showed that 5% of the participants had fracture Right distal radius.

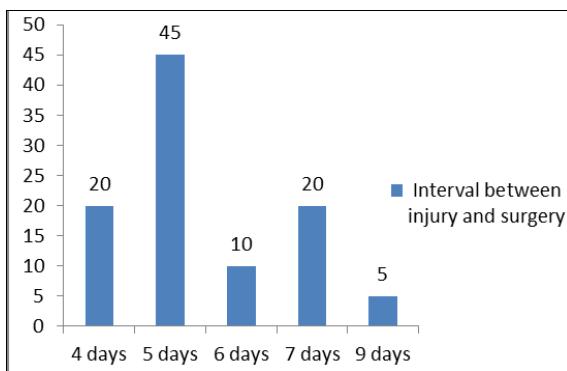
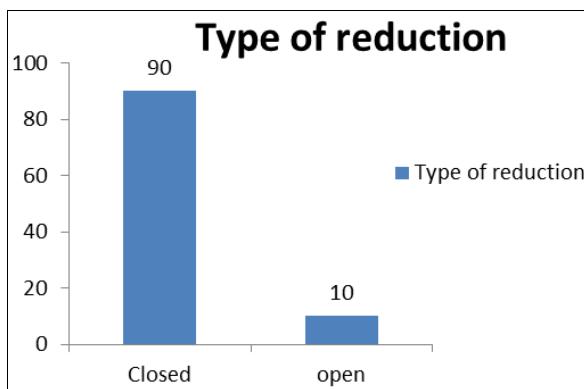
**Fig 7:** Interval between injury and surgery

Fig 7 shows interval between injury and surgery. Results of the study showed that in 45% of cases had interval of 5 days, followed by 20% having 4 days and 7 days.

**Fig 8:** Type of reduction

**Fig 8:** shows type of reduction. Results of the study showed that majority of the reduction were done closed type that is 90%.

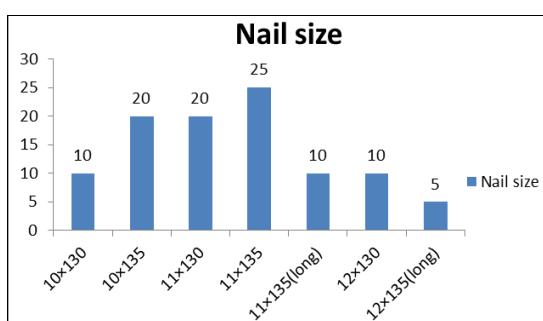
**Fig 9:** Nail size

Fig 9 shows nail size. Results of the study showed that for majority of the participants (25%) nail size used was 11x135, followed by 10x135 (20%) and 11x130 (20%).

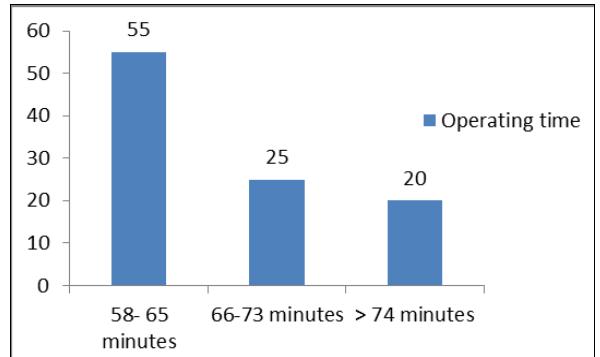
**Fig 10:** Operating time

Fig 10 shows operating time. Results of the study showed that for majority of the participants operating time was between 58 – 65minutes (55%), followed by 66-73minutes (25%) and >74minutes (20%).

**Table 1:** Mean operating time

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
minutes	20	58	80	66.80	6.049

Table11shows mean operating time. Results of the study showed that mean operating time was  $66.8 \pm 6.04$  minutes.

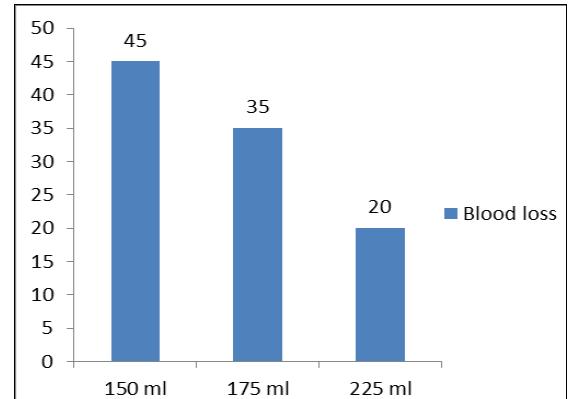
**Fig 2:** Blood loss

Fig12 shows blood loss. Results of the study shows that majority of the participants had blood loss of 150ml (45%), followed by 175ml (35%) and 225ml (20%).

**Table 3:** Mean blood loss

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Blood loss (ml)	20	150	225	173.75	28.648

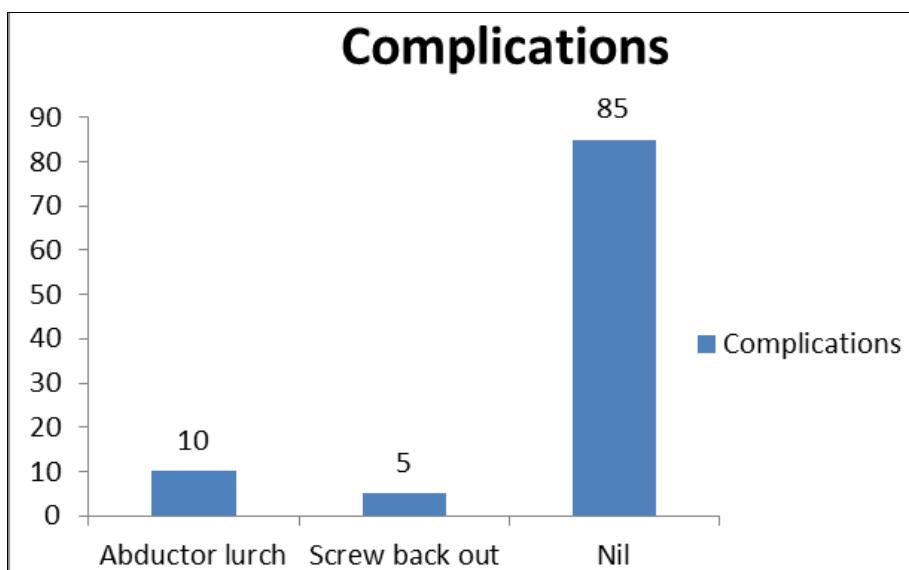
Table13 shows mean blood loss. Results of the study showed that mean blood loss was  $173.75 \pm 28.64$  ml

**Table 4:** Mean Fluoroscopic exposure

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Fluoroscopic exposure	20	68.0	225.0	109.300	42.6702

Table 14 shows mean fluoroscopic exposure. Results of the study showed that mean fluoroscopic exposure was

$109.3 \pm 42.67$ .



**Fig 14:** Complications

Fig 14 shows complications. Results of the study shows that 10% had Abductor lurch and 5% had screw back out.

**Table 5:** Mean values

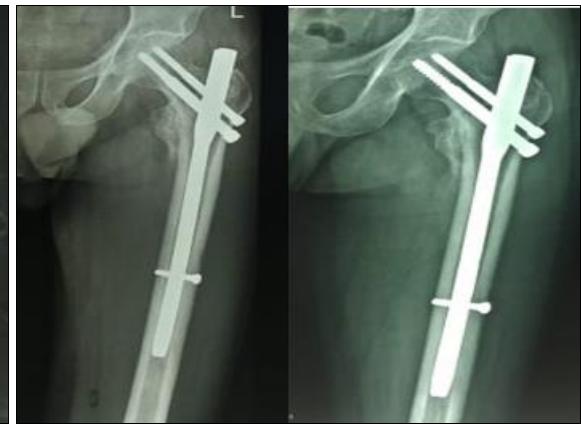
	N	Minimum	Maximum	Mean	Std. Deviation
Time for union (weeks)	20	12	16	12.90	1.410
Harris hip space at 3 months	20	70	80	73.85	3.483
Harris hip space at 6months	20	81	90	85.15	2.661
Follow up in months	20	11.0	22.0	15.900	2.7319

Table 15 shows that mean time for union was  $12.90 \pm 1.4$  weeks. Mean Harris hip space at 3months was  $73.85 \pm 3.4$ ,

mean harris hip space at 6months was  $85.15 \pm 2.66$  and mean follow up in months was  $15.9 \pm 2.73$ .



**Fig 1, 2:** Preop and immediate post-op x-ray



**Fig 3, 4:** follow up x-ray at 3 months and 6 months

## Discussion

### AGE

Age group wise distribution of the study participants showed that majority if the participants were in the age group of 51-65 years (40%), followed by 37- 50 years (28.6%) and >66 years (28.6%). In a study conducted by Prajapati P *et al.*, 33.3% of the participants were in 61-70 years age group. In a study conducted by Boldin C *et al.*, majority of the participants were in 61-70 years age group.

### Gender

Gender wise distribution of the study participants showed that majority if the participants were male (65%) and 35% were

female participants. Similar findings were seen in the study conducted by Prajapati P *et al.* and Boldin C *et al.*, where majority of the participants were males.

### Mode of injury

Results of the study showed that majority had road traffic accident (60%) and 40% had accidental fall.

### Type of fracture

In the study majority of the participants fell in stage III (65%) and 35% had stage IV

### Side of injury

Results of the study showed that majority of the participants had injury on left side (65%) and 35% on right side. In a study conducted by Uzun M *et al.* majority of the participants had right hip fracture.

Interval between injury and surgery showed that in 45% of cases had interval of 5 days, followed by 20% having 4 days and 7 days.

Majority of the participants (25%) nail size used was 11×135, followed by 10×135 (20%) and 11×130 (20%).

Results of the study showed that for majority of the participants operating time was between 58–65 minutes (55%), followed by 66–73 minutes (25%) and >74 minutes (20%). In this study mean operating time was  $66.8 \pm 6.04$  minutes. In a study conducted by Bellabarba et, the average operating time was found to be 67.7 minutes.

Results of the study shows that majority of the participants had blood loss of 150ml (45%), followed by 175ml (35%) and 225ml (20%).

In this study mean blood loss was  $173.75 \pm 28.64$  ml. In a study conducted by Bellabarba et, the average blood loss in patients treated with the PFN nail was 227 ml. Results of the study showed that mean fluoroscopic exposure was  $109.3 \pm 42.67$ .

In this study complication seen among participants was as follows, 10% had Abductor lurch and 5% had screw back out. In a study conducted by Mc Connell *et al.*, incidence of abductor lurch in the post-operative period was 17.5%.

Mean time for union was  $12.90 \pm 1.4$  weeks. Mean harris hip space at 3months was  $73.85 \pm 3.4$ , mean harris hip space at 6months was  $85.15 \pm 2.66$  and mean follow up in months was  $15.9 \pm 2.73$ .

In a study conducted by Prajapati P *et al.*, Harris Hip Score was found to be excellent in 43(57.33%) patients, good in 19(25.33%) patients, fair in 3(4%) patients and poor in 10(13.33%) patients

### **Limitations of the study**

A study with a larger sample size would have made a better analysis of surgical intervention with proximal femur nail. Since follow up in our study was time bound, it is difficult to assess the long-term effects of this intervention. A longer follow up is needed for complete assessment of the implant and intervention.

### **Conclusion**

Intramedullary nailing with the PFN has distinct advantages over DHS like shorter operating time and lesser blood loss for unstable trochanteric fractures

Early mobilization and weight bearing is allowed in patients treated with PFN thereby decreasing the incidence of bedsores, uraemia and hypostatic pneumonia.

The incidence of pre-operative and postoperative planning and correct technique, adequate reaming of femoral canal, insertion by hand and meticulous placement of distal locking screws.

PFN is a significant advancement in the treatment of unstable trochanteric fractures which has the unique advantage of closed reduction, preservation of fracture haematoma, less tissue damage during surgery, early rehabilitation and early return to work.

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