



OUTCOME OF PROXIMAL FEMUR NAILING IN FRACTURE OF PERITROCHANTERIC FEMUR

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ABSTRACT **Introduction:** Peritrochanteric fractures demand special consideration in orthopaedic trauma, because defective union of this fracture can lead to high disability levels for an individual and thereby loss of many valuable days. Femoral Nail by AO-ASIF in 1997, for various types of upper femoral fractures claims to give superior results than other techniques.

Aims And Objectives: Our study aimed to evaluate the clinical, functional and radiological results of peritrochanteric fractures managed proximal femoral nailing.

Materials And Method: 80 patients with peritrochanteric fractures that were treated by Proximal femoral nailing between June 2018 to December 2019 were included in this study. The Harris hip score was used to evaluate the outcome.

Results: Out of 80 patients 50 were male and 30 were female. The mean age was 60 years (range 20-89 years). surgical outcome was excellent in 60 cases, Good in 11 and Fair in 6 cases, poor in 3 cases.

Conclusion: Fixation with Proximal femoral nail is associated with good to excellent functional outcomes. It gives high rate of union, good range of movement and has minimal complications.

KEYWORDS :

INTRODUCTION

Fast life styles, rapid and high speed transportation, risky infrastructural projects have brought in high morbidity and mortality due to trauma in general and fractures of femur in particular. Among the femoral injuries Peritrochanteric femoral fractures present a problem of securing effective neutralization of deforming forces. mechanical stresses at this level are very high. Peritrochanteric fractures demand special consideration in orthopaedic trauma, because defective union of this fracture can lead to high disability levels for an individual and thereby loss of many valuable days. Management of this fracture is challenging, because this zone of femur is subjected to maximum amount of mechanical stress, tensile and compressive stresses can exceed several multiples of body weight (causing failure of implants), cortical bone (slow healing), associated comminution, short proximal fragments which are deformed by hip flexors and abductors making reduction of fracture difficult. Internal fixation for managing these fractures that generally fall into two categories: some form of intramedullary fixation and extramedullary fixation. Upper femoral devices like dynamic condylar screw, dynamic hip screw with barrel plate, etc. are being used by various centres and each centre claims reasonably satisfactory results with each type of device but no single technique has proved to give excellent results. Evolution of Proximal Femoral Nail by AO-ASIF in 1997, for various types of upper femoral fractures claims to give superior results than other techniques.

AIMS AND OBJECTIVES:

- To Study Results Of Proximal Femoral Nailing In management Of Peritrochanteric Fractures Of Femur
- To Assess The Outcome In Peritrochanteric Fracture Femur Treated With PFN As Per Harris Hip Score.
- Average Time Taken For Radiological Union When Peritrochanteric Fracture Is Treated With PFN.
- Compare Final Outcome Of Our Study With Other Available Modalities Of Fixation Of These Fractures.

CLASSIFICATION:

There are numbers of classifications used in orthopaedic trauma For

Petrochanteric Femur Fracture are

- (1) Boyd and Griffin
- (2) Fielding'
- (3) Seinsheimer
- (4) Watson Jones
- (5) Russel Taylor
- (6) Muller/AO Classification

MATERIALS AND METHODS:

We have done a prospective study of 80 fractures of Proximal femur fracture treated by PFN at our institute and they were followed up at regular interval with follow up of minimum six months.

Inclusion Criteria:

- Above 18 years of age including both sex
- All Closed fractures
- All open grade 1 fractures

Exclusion Criteria:

- Patients <18 years
- All open grade 2&3 Fractures
- Associated vascular injury or Compartment Syndrome
- Pathological Fracture
- Not fit for anesthesia

Surgical technique:

- Patient were given spinal or epidural or General anesthesia
- Position: supine
- Table : Fracture table
- C – arm image intensifier from opposite site.

Instruments:

- Surgical instruments
- Reamers and guide pins
- PFN –long& short
- Standard instrument set and jig



Figure: 1 Standard Instrument Set

- 1.Screw driver 6.Protector sleeve 11.Spanners 17.Guide wire
- 2.Proximal reamer 7.Guide pins 12.Top screw
- 3.Drill bits(5.9 mm) 8.PFN jig 13.Trocars
- 4.Box spanner 9.Nail 14.Inner sleeve
- 5,16. Backtrack assembly 10.Awl 15.Outer sleeve



Figure 2: PFN Assembly

Patient shifted to a radiolucent fracture table in a supine position with perineal post. Operative leg was slightly adducted and put on traction. Opposite limb was put in a full abduction as to give space for the C-arm in between the legs. Adduction of the fractured limb helps in easy insertion of nail.

Adduction of the limb is attained by

- pulling the chest and abdomen part of the patient towards the normal unaffected side by assistants or chest straps
- Keeping the jig close to the body and inserting the nail in this position.

REDUCTION TECHNIQUE:

Reduction was achieved by traction and internal rotation primarily or external rotation and adduction or abduction as required. Reduction was checked in a C-arm with AP and lateral view.

If indirect reduction was not satisfactory the following methods were used

- Insertion of steinmen pin in the proximal fragment and manipulation, so as to correct the deformity.
- Manipulate the proximal fragment with nail insertion
- As and when needed, Mini Incision was put over fracture site such that it is later incorporated in the incision for putting neck screws. The reduction was achieved through this incision and held with clamp till the proximal locking was done.

Surgical Steps:

3-4 cm linear incision put 3cm proximal to Greater trochanter in the line of shaft of femur. Entry taken with awl/guide pin over a protector sleeve. It should be on the tip of the greater trochanter in AP and lateral view. For Subtrochanteric fracture, we usually take medial entry via piriform fossa. 2.8mm guide wire is inserted across the fracture site through the cannulated awl. Its position is checked in the C-arm and the entry is widened with the proximal reamer. Reaming of the proximal femur is done upto the proximal part of the nail to be introduced. Nail is fixed on the jig and the alignment is checked. Then the nail is inserted into the femur. The position of the holes for the hip screws is checked in the C-arm for the depth of the nail insertion. Guide wires for the screws are inserted via the jig and the drill sleeve. The ideal position of the guide wires is parallel and in the lower half of the neck in AP views, in a single line in the center of the neck in the lateral views. The guide pins are inserted up to 5 mm from the articular surface of the femoral head and size of the lag screw determined. Drilling for lag screw is done. First the 8mm hip screw is inserted after drilling over the distal wire

and then the 6mm cervical screw. The hip screw should be 5mm away from the sub-chondral bone. In Intertrochanteric fracture we do single distal lock or did not do distal lock, while in subtrochanteric fracture, both distal lock were done. It is done freehand with the help of IITV If the short nail is used, the distal lock can be done through the jig. The final position of the nail is checked in the C-arm in both views and the jig is removed. The wound was closed in layers.

POST OPERATIVE PROTOCOL:

- Antibiotics: inj. Ceftriaxone 1 gm I.V. 12hrly was given for first 3 days and then oral antibiotics were given till stitch removal.
- Quadriceps physiotherapy: strengthening exercises, and calf pumping are started as soon as the patient is out of anesthesia followed by KNEE and ANKLE mobilization on post op day 1.
- Patient is discharged as soon as the wound and general condition of the patient is satisfactory, around POD 3 to 5.
- Sutures were removed on 12th to 14th post-op day.
- Patients were advised for non-weight bearing walker walking (NWBW) as soon as the patient can.
- Partial weight bearing walker walking (PWBW) was started at around 8 weeks.
- Full weight bearing walker walking was allowed after assessing for radiological and clinical union usually around 3-4 months.

FOLLOW UP:

- patient is asked to come for follow up 1, 2, 3 and 6 months from the date of surgery. At each follow up patient is assessed clinically as per Harris Hip score and x ray AP/LAT view of hip with femur and knee with femur is taken.

OBSERVATION AND RESULTS:

1. Age/ Mode Of Injury

Age	No. of Patients (%)	Type	
		High Velocity	Low Velocity
20-50	25 (37.73%)	21	4
>50	55 (66.27%)	19	36
Total	80(100%)	40	40

All the patients involved in this study were above 20 years of age. The youngest patient was 20 years old and oldest patient was 89 years old. Average age of our patients was 60 years.

In young adults injury was caused by high velocity and in older age group, main cause is low velocity trauma.

2. Sex Distribution

Sex	Numbers	Percentage
Male	50	62.5
Females	30	37.5
Total	80	100

50(62.5%) patients were male in this series.

3. Mode Of Injury

Most common cause of injury was RTA followed by Fall on ground.

Cause	Number	Percentage
RTA	39	48.75
Fall down	35	43.75
Assault	6	7.5
Total	80	100

4. Associated Injuries:

System Involved	Number of Patients	Percentage
Skeletal	12	14.46
Other System	3	3.61

Overall 15 patients had associated injuries. 12 patients had associated injuries in form of fracture of shaft femur, distal end radius fracture, calcaneum fracture etc.

3 patients had other system injuries in form of Head injuries.

5. Fracture Side:

Side	Number of Patients (%)
Right	44
Left	36

Right extremity was more involved.

6. Associated Medical Condition

Disease	Number of patients (%)
Hypertension	13 (15.66%)
Diabetes	7 (8.43%)
Others	6 (7.23%)

13 patients had hypertension and 7 had diabetes out of which 3 of them had both diabetes and hypertension. 1 patient had Carcinoma breast, asthma along with diabetes and hypertension and had to be admitted in ICCU postoperatively. Out of other medical conditions Epilepsy, HIV, and heart disease were present with causal incidence of 1 each, whereas COPD was present in two patients.

7. Types Of Fracture

Type of fracture	No. of patients
Intertrochanteric	42
Subtrochanteric	41
Total	83

8. Operative Time

Average time of surgery for PFN was 70.42 minutes.

9. Union

The average radiological union time for Intertrochanteric fracture was 4.79 months, and for Subtrochanteric fracture was 5.32 months. The average Full Weight Bearing walking time was 3.81 months ranging from 2 months to 6 months. The average Partial Weight Bearing was 2.27 months. 5 patients had non-union at the end of follow up.

10. Associated Procedures:

In 3 patients with long spiral fracture, encirclage wiring was done by opening fracture site, to hold fragments.

11. Limb Length

	Shortening 1-2cm	Shortening <1 cm	Lengthening <2cm	Normal
Number of Patients	5	9	1	65

65(81.25) patients had normal limb length postoperatively.

12. Complications:

	Non Union	Back out Screw	Infection	Lag Screw Breakage	Others
Number of patients	2	2	2	2	5

2 patients had early post-operative infection which was resolved with antibiotics and dressing. 2 patients with screw backout were treated by inserting new screw of smaller size. One patient with back out nail with pre-existing comorbidities, developed fatal complications (DVT) and died. 2 patients had breakage of calcar screw but they did not agree for any intervention but eventually progressed to union.

13. Results Based On Harris Hip Score:

Results	No. of Patients (%)
Excellent	60(75%)
Good	11(13.75%)
Fair	6(7.5%)
Poor	3(3.75%)

71(88.75%) patients had good to excellent results according to Harris Hip score.

DISCUSSION

In comparison with intertrochanteric fractures, subtrochanteric fractures are generally associated with slightly higher failure rates because the proximal fragment has the tendency to anteflex relative to the distal fragment, owing to psoas muscle activity, and shorter distance from locking screw hole to fracture. Non-surgical treatment of peri-trochanteric fractures has no or little place due to the high rates of non-unions, malunions due to inability to control muscle forces pulling the fracture fragments in different directions, as well as the morbidity and even mortality associated with the prolonged immobilization.

We have studied 80 cases of peritrochanteric fracture of femur treated with proximal femur nailing.

1. Demographic Data:

Mean age of the present study population was 60.52 years and around 71 % were older than 50 years.

Table 1: Comparison Of Different Series For Demographic Data

Series	% of Males	% of Females	Mean Age (years)
Erhan et al ¹	69	31	39
Sheing et al ²	78	22	53
Domingo et al ³	24	76	80.1
Sangwan et al ⁴	62	38	37.6
Tyllianakis et al ⁵	37.78	62.22	72
Current Study	62.5	39.76	60.52

Male predominance was seen in most of the series and most of them were around 50- 60 years of age mainly because of more active life and thus more exposure to trauma. It is found in the older age group mainly due to osteoporosis.

The more recent ones Erhan et al¹ 2005, Asian studies Shein et al², SS Sangwan et al⁴ had a majority of male subjects >60% and a younger age group. This was in contrast to studies by Domingo et al³ and Tyllianakis et al⁵ which had an older age group with female predominance.

The mode of injury in young (91.67%) is due to a high velocity trauma similar to the Indian series by SS Sangwan et al⁴ which had 75% of patients with high velocity motor vehicle accidents. In our series, high velocity trauma was observed in 50% of cases. The lower incidence of RTA in our series may be due to more no. of older patients.

2. Duration Of Surgery

Our study shows that surgery time with PFN takes a shorter time (mean duration of 70.42 minutes) compared to extramedullary implants like DHS/DCS and blade plates, on comparison with other series.

Table 3: Comparison Of Different Series Showing Mean Duration Of Surgery In Minutes

Series	Implant	Operating time (mins)
Halder et al ⁶	Gamma Nail	80
Sangwan et al ⁴	K Nail	50
Rahme et al ⁷	Blade Plate	171
Shieng et al ²	PFN	49
Sadowski et al ⁸	DCS	166
Current study	PFN	70.42

Reviewing the literature, it was seen in different series that the time taken for surgery was variable and dependent on number of factors like the type of fracture, bone structure of the patient, the skill of the operating surgeon etc. and not solely on the implant used but nevertheless the surgical time for PFN is less than extramedullary fixations. In our series average duration of surgery in Intertrochanteric and subtrochanteric fracture is 63.2 minutes and 76.3 minutes respectively which is less than the time taken for extramedullary fixation. This is uniformly seen in most of the series. Though PFN is preferably done as a close surgery but if the reduction is not acceptable then an open reduction followed by PFN may be done. In our series, as and when needed we had resorted to open reduction.

3.COMPLICATION

We had 2 cases of infection of which only one was deep which were cured by antibiotics and dressing. Chances of postoperative infection in PFN are much less owing to small incisions and less surgical dissection.

There was Limb length discrepancy of <2cm in 14 patients which was compensated by pelvic tilt and the patients had no problem in walking.

There were 2 non unions (2.5%) in our study. Non-union rate of 28% (Rahme et al⁷), 10% (Erhan et al¹) for Angled plate have been reported. Similar studies with PFN have reported non-union rates of 0% (Shieng et al²). In our series 3 patients were bone grafted and had good union, in the 4th patient bipolar was done and the patient is now ambulatory. The 5th patient did not agree for any intervention. The slightly higher rate of non-union could be because of the fact that this research work was done in an institute where different surgeons with different surgical skills operate on the patient. The other reason could be that this is a government institute which mainly caters to patients

with low socioeconomic status with poor nutrition thus hampering the healing.

There was 1 mortality in our study which was attributable to concomitant medical problems(CA Breast, Asthma ,Hypertension , Diabetes Mellitus) and the PFN did not appear to have contributed to patient's medical complication and death.

CASE

50yrs/Male, H/O RTA, Presenting With Lt. Subtrochanteric femur Fracture Operated By PFN



Pre-operative

6 months follow up



Clinical Pictures

CONCLUSION

- Of all the available modalities of fixation of peritrochanteric fractures, Proximal Femur Nail (PFN) has given good overall results and is superior to other extramedullary implants for management of peritrochanteric fractures.
- PFN is a closed nailing procedure which achieves a biological fracture fixation with minimal blood loss, preserving the fracture hematoma and thus aiding in healing of the fractures.
- As compared to other modalities, there is a low infection rate, as well as fewer postoperative complications.
- Proximal and distal bolts passed through femoral nail gives good stability in axial and rotational axis, preventing shortening and malunion and allowing early mobilization.
- PFN should always be considered for management of peritrochanteric femur fractures in young as well as elderly patients even in those who have multiple pre-existing comorbidities.

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