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## Outcome of intertrochanteric femur fractures treated with short proximal femoral nail

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### Abstract

**Background:** Inter-trochanteric femur fractures are becoming more common since life expectancy is on rising trend in India. Intertrochanteric femur fractures are treated with various implant systems. Proximal femoral nail is a newer implant available for internal fixation of intertrochanteric femur fracture. Purpose of this study is to study outcome of intertrochanteric femur fracture treated with short proximal femoral nail.

**Method:** A cohort of 30 cases of intertrochanteric fracture treated with proximal femoral nail at SSG hospital, Vadodara were taken up and followed up for 6 months between October 2017 to April 2018.

**Result:** Average modified harris hip score was 94.4 at final follow up (6 months) in this study.

**Conclusion:** Results of intertrochanteric femur fractures treated with proximal femoral nail are good and satisfactory.

**Keywords:** Intertrochanteric femur fracture, proximal femoral nail, modified harris hip score

### Introduction

With increasing life expectancy, incidence of intertrochanteric femur fractures is on the rising trend all over the world except certain areas like Denmark <sup>[1]</sup>. Majority of these patients are over 50 years. Females are 2-3 times more commonly affected than males <sup>[2]</sup>. There are currently four basic implant systems available for operative fixation of intertrochanteric femur fractures:

1. Fixed nail plate devices – Jewet Nail
2. Sliding nail plate devices like Dynamic Hip Screw (DHS), Medoff Plate, Dynamic Condylar Screw (DCS)
3. Intramedullary devices like condylocephalic nail (ender's nail), Gamma Nail, Proximal Femoral Nail (PFN), PFN-A etc.
4. Hemireplacement Arthroplasty (HRA) especially for severely comminuted intertrochanteric femur fractures.

Presently, intertrochanteric femur fractures are treated either with Dynamic Hip Screw (DHS) or Proximal Femoral Nail (PFN) <sup>[3]</sup>. The Sliding Nail Plate device like DHS has remained a gold standard for intertrochanteric femur fractures with overall good results <sup>[4]</sup> Intramedullary (IM) nails are increasingly popular compared to plate fixation for treatment of intertrochanteric hip fractures among the young surgeons. This change has been noted despite a lack of evidence in the literature to support this change and potentially known complications <sup>[5]</sup>. The purpose of this study is to study short term outcome and complications (both intra-operative and post operative) of intertrochanteric femur fractures treated with Proximal Femoral Nail.

### Materials and methods

This prospective observational study includes a total of 30 patients of intertrochanteric femur fracture treated with PFN at SSG Hospital, Vadodara between October 2017 and April 2018. Patients were selected based on following criteria.

### Inclusion Criteria

All patients with Intertrochanteric femur fracture

### Exclusion Criteria

- Patients with intertrochanteric femur fracture with sub trochanteric extension
- Patients with localized or generalised infection
- Patients with associated other fractures (polytrauma patient)
- Patients who are medically unfit for surgery

All the patients were admitted and pre operative routine blood investigations, ECG, chest Xray, Xray of pelvis with full length femur were carried out. Evan's classification was used for classification of intertrochanteric fracture. Necessary physician fitness was obtained prior to surgery. Cardiac and Respiratory Optimization was done according to physician's advice. All the patients were operated under spinal anaesthesia. Patients were taken on traction table and closed reduction of fracture was carried out. After obtaining satisfactory reduction, painting and draping were done. Standard stainless steel short proximal femoral nail (length: 240 mm) with CCD angle of 135° of varying diameter were used for all patients. Two proximal lag screws (8.0mm and 6.4mm) of appropriate size were inserted. Distal locking was done using two 4.9 mm interlocking screws inserted through the Jig.

Post-op radiograph of pelvis and full length femur was taken. Post operative mobilization was carried out on 1<sup>st</sup> post-op day. High sitting, Non-weight bearing walking using walker, knee and ankle mobilization, Quadriceps strengthening exercise were allowed. Injectable antibiotics were started according to hospital protocol. Patients were usually discharged on 3<sup>rd</sup> post-operative day after dressing. Follow up visits were scheduled on 7<sup>th</sup> post-op day for dressing and 14<sup>th</sup> post-op day for suture removal. Follow up Radiographs were taken 1 month after suture removal and partial weight bearing was allowed. Final follow up was done 6 months post-operatively. Hip function was assessed using Modified Harris Hip score and final follow up radiograph was obtained.

### Results & discussion

A total of 30 cases were studied. Average age of the patients was 47 years with youngest patient being 24 years and oldest being 78 years. Majority of patients under 50 years of age had high energy trauma like road traffic accident while patients above 50 yrs of age had low energy trauma like fall in washroom. Majority (70%) of the patients were labourer by occupation.

Fracture Type	Patients	Percentage (%)
A-1	10	33.3
A-2	16	53.4
A-3	04	13.3
Total	30	100.0

5 patients had hypertension as co-existing illness. Average hospital stay was 6 days. Short PFN (240 mm) were used for all patients with most common diameter being 9mm. No patient had suffered from intra-op or immediate post-op complication. Patients were assessed by Modified Harris Hip Score at final follow-up which includes following parameters:

- Pain
- Limp
- Requirement of support for walking
- Distance walked in one stretch
- Ability to sit on a chair
- Ability to use public transportation

- Ability to use stairs
- Ability to put on shoes and socks by self

### Range of motion at hip joint

- Presence of deformity (Fixed Flexion Deformity or Limb Length Discrepancy)

Average Modified Harris Hip Score was 94 at the end of 6 months. 27 patients (90%) had excellent scores while the remaining 3 had good scores. None of them had implant related complication like breakage of implant or backed out screws.

The ideal implant for the treatment of intertrochanteric femur fracture is still a matter of discussion. From a biomechanical point of view, intramedullary device with two lag screws is far superior than Sliding Hip Screw in terms of axial and rotational stability [6]. However, biomechanical advantages are not associated with decrease implant related complications in clinical setting [7]. Current study finds PFN as an excellent choice for intertrochanteric femur fracture as short term outcome for the said implant are excellent. There is significant decrease in operative time with PFN as compared to DHS. Contrary to one's beliefs, difference of blood loss during the surgery between the two implants is statistically insignificant [8].

Use of PFN is associated with lower rate of implant related complications like lag screw cut out, varus collapse as compared to DHS. But Femoral fractures at the tip of the nail after trivial trauma, z effect are real concerns for PFN. Z effect following fracture fixation is usually seen when there is significant comminution in medial femoral cortex (calcar region) [9].

A modified proximal femoral nail for Asian people is available with a length of 180 mm, mediolateral curvature of 4°, proximal diameter of 16 mm, distal diameter of 11 & 12 mm. This modified nail is associated with lower risk of intra-operative and post-operative complications than standard nail when used for Asian people who have short stature when compared with their western counterparts [10].



Immediate post-operative photograph of intertrochanteric fracture treated with short proximal femoral nail

### Conclusion

The Proximal Femoral Nail with two lag screws is a good implant design for intertrochanteric femur fracture. When compared with DHS, it is not found superior by any parameter except shorter operative time. Limitations of this study are small population (30 patients) and short follow-up period (6 months). Even with PFN, quality of intra-operative fracture reduction, continuity of medial cortex, placement of lag screws, Tip Apex Distance are vital parameters affecting fracture union.

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