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# EVALUATION OF CLINICAL AND RADIOLOGICAL OUTCOME OF INTERTROCHANTERIC FRACTURES OF FEMUR TREATED WITH PROXIMAL FEMORAL NAIL : A PROSPECTIVE STUDY

**Orthopaedics**

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## ABSTRACT

**Background:** With purpose to evaluate the outcome of proximal femur nail procedure ,we carried out a prospective observational study in which 40 patients, underwent Proximal Femoral nailing for intertrochanteric fracture femur at Govt. R.D.B.P Jaipuria Hospital, Jaipur, Rajasthan. **Materials and Methods:** Patients were included as per the inclusion and exclusion criteria in the study. All patients were followed up at 4 weeks, 6 weeks, 8 weeks, 12 weeks, 16weeks and 24 weeks and later depending on the fracture healing status. X ray of the operated hip with femur –anteroposterior and lateral views were taken during follow up. Kyle's criteria and Harris hip score was measured at 6 months follow up. **Results:** The Kyle's criteria was Excellent in 22 patients (55%), Good in 13 patients (32.5%), Fair in 4 patients (10%) and poor in 1 patient (2.5%) **Conclusion:** proximal femoral nail (PFN) is a good minimally invasive implant for stable and unstable proximal femoral fractures. It's particularly beneficial in elderly and osteoporotic population. Adequate fracture reduction is critical in management of the intertrochanteric fractures. Achieving good anatomical reduction and maintaining the tip apex distance less than 25mm will avoid the implant related complications.

## KEYWORDS

Proximal Femoral nailing, Kyle's criteria, Harris hip score, intertrochanteric fracture, tip apex distance

## OBJECTIVE

Intertrochanteric fractures are defined as fractures involving the proximal end of femur through and in between both trochanters with or without extension into upper femoral shaft[1]. Intertrochanteric fracture is one of the most common fractures of the hip especially in the elderly population. The incidence of intertrochanteric fracture is rising because of the increase in number of elderly population superadded with osteoporosis[2]. It has been noted that factors like loss of posteromedial support, severe communition, reverse oblique fracture, sub trochanteric extension of fracture, shattered lateral wall, extension in femoral neck and poor bone quality may lead to fixation failure and instability[2] The main goal of treatment in elderly population is early mobilisation. Intramedullary nailing devices have been reported to produce good results and is becoming popular for treatment of intertrochanteric fractures[3],[4]

The advantages of the proximal femoral nail are –1) Proximal Femoral Nail is a minimally invasive procedure Being an intramedullary device, it compensates for the medial column, Early postoperative weight bearing can be started in Proximal Femoral Nail as it is a biomechanically stable construct

Although the effects of Proximal Femoral Nail in treatment of inter-trochanteric fractures have been studied by many researchers, but the results and conclusions are not consistent[5-10]. The debate is still on regarding the choice of implant for fixation of unstable intertro chanteric fractures especially in osteoporotic bones. Therefore, the aim of our study is to assess the clinical and radiological outcomes of intertrochanteric fractures treated with Proximal Femoral Nail in Indian population, where functional recovery of hip is very important to do daily activities like squatting, sitting crossed legged, etc.

## METHODS

In this Prospective observational study 40 patients, underwent Proximal Femoral nailing for intertrochanteric fracture femur at Govt. R.D.B.P Jaipuria Hospital, Rajasthan,

With strict inclusion criteria ambulatory patient (pre – injury status) of 18 yr. and above, Traumatic displaced inter-trochanteric fracture of femur less than 7 day old at the time of admission and Patients who gave consent to be a part of the study. Exclusion criteria were skeletally immature individuals, Patients with compound fractures, Patients with pathological fractures other than osteoporosis related, Patient with existing neurological deficits, Patients having other fractures in upper and lower limb which may alter mobilization of the patient after surgery.

Procedure :The patients were grouped based on the Boyd and Griffin Classification[11], following which the technical aspects of the surgery were planned.The patient was operated using standard surgical PFN Nailing technique, The acceptable reduction was when neck-shaft angle was reduced within <5° and fracture site displacement <4 mm as compared to normal side.Patients were mobilized non-weight bearing with support as soon as the pain or general condition permitted. Weight bearing with support was commenced depending upon the stability of the fracture and adequacy of fixation.

**Follow Up :**

In our study, all patients were followed up at 4 weeks, 6 weeks, 8 weeks, 12 weeks, 16weeks and 24 weeks and later depending on the fracture healing status. X ray of the operated hip with femur – anteroposterior and lateral views were taken during follow up. Kyle's criteria and Harris hip score was measured at 6 months follow up. Complications if any were noted.Data was collected prospectively from the time of admission till 6 months after surgery. History taking, periodic functional and radiological assessment was done.

Picture (1) and (2): Immediate post-op and 6 months post-op radiographs

Legend of figure (3): 6 months follow-up cross legged sitting.

Radiographs of affected Hip with femur (anterior-posterior and lateral view) was done postoperatively and during 6 weeks, 12 weeks, 16 weeks, 20 weeks and 24 weeks follow up to assess malunion, delayed union, non-union of fracture or any implant related complications. In case of delayed union or non-union periodic radiographic monitoring of the fracture was done to see the progression of healing. The quality of fracture reduction was assessed on postoperative radiographs as per BaumgaertnerMR[12]. The functional assessment was done with Kyle's Criteria (Appendix II) and Harris Hip Score (Appendix III) at 6 months follow up. Complications such as infection, hardware failure, wound dehiscence, neurovascular injury, compartment syndrome, etc. were recorded.

## RESULTS

The majority of the patients were 60 years of age and above, which accounts for 77.5% in our study. Majority of the patients had Boyd and Griffin Type II fracture, 25 out of 40 patients, accounting for 62.50% of patients.

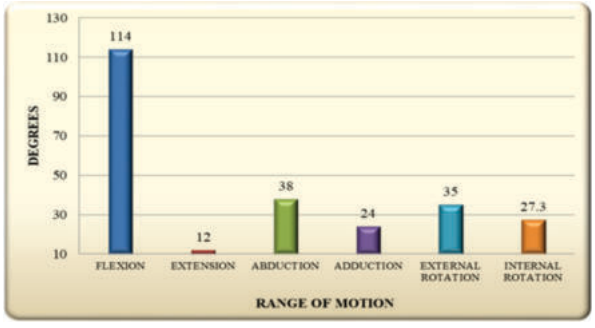


**Chart (1): Range of movement at 6 month follow-up.**

The mean flexion in our study was 114 ± 7.6 degrees, mean extension was 12 ± 6 degrees, mean abduction was 38±6.4 degrees, mean seen was 24 ± 5 degrees, mean external rotation was 35 ± 7 degrees and mean internal rotation was 27.3 ± 5.88 degrees. Out of 40 patients, 27 patients (67.5%) were without pain, 9 patients (22.5%) had occasional mild pain and 4 patients (10%) had moderate pain. The Kyle's criteria was Excellent in 22 patients (55%), Good in 13 patients (32.5%), Fair in 4 patients (10%) and poor in 1 patient (2.5%)

The mean Harris Hip Score seen was 85.7 ± 10.6 at final follow up. The score was Excellent in 22 patients (55%), good in 12 patients (30%), Fair in 5 patients (12.5%) and poor in 1 patient (2.5%)The mean fracture union time seen in total number of patients (n=40) was 14.80 ± 2.26 weeks. The minimum fracture union time seen was 12 weeks and maximum fracture union time seen was 20weeks.

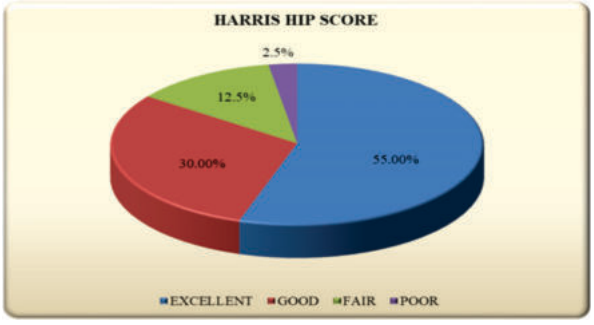


**Chart (2): diagram showing harris hip score in follow-up.**

The mean Tip Apex Distance was 19.15mm ± 3.53; minimum tip apex distance was 12mm while maximum tip apex distance was 28mm.Out of 40 patients, one patient had superficial skin infection, one patient had varus collapse, one patient had Z- effect, 1 patient had screw cut out and one patient had on non-union.Most of the complications in our study were seen in patients in whom reduction was poor or acceptable and patients in whom tip apex distance was more than 25 mm.

## DISCUSSION

The study is conducted to assess the clinical and radiological outcomes of intertrochanteric fractures treated with Proximal Femoral Nail in Indian population. From biomechanical point of view the intramedullary devise is superior over the extramedullary devise in treatment of unstable intertrochanteric fractures[12]. Proximal femoral Nail (PFN) helps the surgeon to minimize soft tissue dissection and thereby reducing surgical trauma, blood loss, infection, and wound complications[13]. As per the study of Kapila R et al[14], 80% of the patients had good range of movement at hip (greater than 90° of flexion and greater than 35° of abduction) and resumed their pre injury walking ability. 16% had fair range of movements (flexion 60-90° and abduction 20-35°) and were using a walking aid. In our study, the mean flexion noted was 114º ± 7.6, all the patients had flexion more than or equal to 90º. The mean abduction noted was 38º ±6.4, ninety percent patients had good abduction (>35º) while 10% patients had abduction less than 35º at final follow up.

James B[15] observed excellent Harris Hip Score in 40% cases, good in 45%, fair in 5% and poor in 10% patients. In our study we observed more patients with excellent Harris Hip Score (55% patients) which can be due to good quality of reduction achieved, good Harris Hip Score was seen in 30% patients, fair in 12.5% and poor in 2.5%.

BaumgaertnerMR[16] in 1995 studied the value of tip apex distance in predicting the failure of fixation of peritrochanteric fractures of the hip in a study of 198 fractures in the AP and Lateral radiographs. They concluded that the average tip apex distance should be less than 25mm for successful fixation of peritrochanteric fractures. The mean tip apex distance in our study was 9.15 mm ± 3.53. One patient had varus collapse and one patient in whom there was screw cut-out the neck shaft angle was in varus i.e. 120º.

BoldinC[17] noted 18.18% (10 out of 55 patients) complications in their study. Z- effect was seen in 3 cases, reverse Z-effect was seen in 2 patients, implant cut-out was seen in 2 patients while 3 patients dies because of cause unrelated to implant. In our study we noted complications in 12.5% cases (5 patients out of 40). One patient had superficial surgical site infection which was treated with appropriate antibiotics as per culture sensitivity report.

There were a few limitations of this study – 1) An analysis of the complications could not be made due to small number of complications encountered during this study. A large sample size would have allowed for a more comprehensive analysis. 2)There was no control group, including an alternative treatment modality other than Proximal Femoral Nail. 3) We did not investigate the effects of comorbidities such as cognitive status, health status, and activity level, all of which may likely affect the outcomes.

## CONCLUSION

We conclude that the proximal femoral nail (PFN) is a good minimally invasive implant and is particularly beneficial in elderly and osteoporotic population in cases of unstable, reverse oblique, intertrochanteric with subtrochanteric variety of fractures. Achieving good anatomical reduction and maintaining the tip apex distance less than 25mm will avoid the implant related complications.

Thus, Proximal Femoral Nail is a reasonably good implant in management of intertrochanteric fractures with good functional outcomes in Indian population.

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