

Clinical and Functional Outcome of Proximal Femoral Fractures Managed with Proximal Femoral Nail

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Abstract: ***Background and Objectives:** Dissatisfaction with use of a sliding hip screw in unstable fracture patterns led to the development of intramedullary hip screw devices. This design offers potential advantages like more efficient load transfer, decrease tensile strength on the implant, controlled fracture impaction, reduces amount of sliding and therefore limits limb shortening and deformity, shorter operative time and less soft tissue dissection potentially resulting in decreased overall morbidity. **Methods:** This is a prospective study of 30 cases of fresh intertrochanteric and subtrochanteric fractures admitted between November 2011 to May 2013. Cases were taken according to inclusion and exclusion criteria. Results were evaluated by fracture union on Xray and Harris hip score. **Results:** In our series of 30 cases there were 23 males and 7 females, maximum age of 90 years and minimum age of 22 years, most of the patients were between 41 to 60 years. Mean age of 57.7 years, of cases were admitted due to slip and fall and with X predominance of right side. Out of 30 cases 19 were intertrochanteric and 11 were subtrochanteric. **Conclusion:** From this sample study, we consider that PFN is an excellent implant for the treatment of Intertrochanteric and Subtrochanteric fractures. The terms of successful outcome include a good understanding of fracture biomechanics, proper patient selection, good preoperative planning and accurate instrumentation.*

Keywords: PFN, intertrochanteric, subtrochanteric

1. Introduction

In younger population, proximal femoral fracture occurs due to high velocity trauma, whereas in elderly population, it is most often due to trivial trauma. Proximal femoral fractures comprises of intertrochanteric and subtrochanteric fractures. Incidence of trochanteric fractures is more in females compared to males due to osteoporosis. Mortality ranges between 15%-20 %. Other risk factors include white race, neurological impairment, malnutrition, impaired vision, malignancy, and decreased physical activity.¹ The incidence of intertrochanteric fractures is gender- and race-dependent and varies from country to country. In the United States, the annual rate of intertrochanteric fractures in elderly females is about 63 per 100,000, in males 34 per 100,000.²⁷

The latest implant for management of intertrochanteric fracture is PFN. This implant is a cephalomedullary device and has many potential advantages like,

- Being intramedullary, load transfer is more efficient.
- Shorter lever arm results in less transfer of the stress and hence less chance of implant failures.
- Shorter operative time, less soft tissue dissection and less blood loss.³

The sliding hip screw has been considered the choice because fracture union predictably occurs. A problem with sliding hip screws is collapse of the femoral neck, leading to loss of hip offset and shortening of leg. Therefore a new intramedullary device Proximal Femoral Nail was designed in 1996 which gives an advantage of minimally invasive surgery.²

Here is an effort to study the results of Proximal Femoral Nail in the management of intertrochanteric fractures and

subtrochanteric fractures by analysing the clinical and functional outcome

Aims and Objectives of the Study

- 1) To study the profiles of patients operated with proximal femoral nail.
- 2) To study efficiency & healing and functional outcome of intertrochanteric and subtrochanteric fractures treated with Proximal femoral nail.

2. Methodology

The material for the present study was obtained from the patients admitted with diagnosis of intertrochanteric fractures and subtrochanteric fractures from November 2011 to may 2013. A minimum of 30 cases were taken and the patients were informed about the study in all respects and informed consent was obtained from each patient.

Inclusion criteria

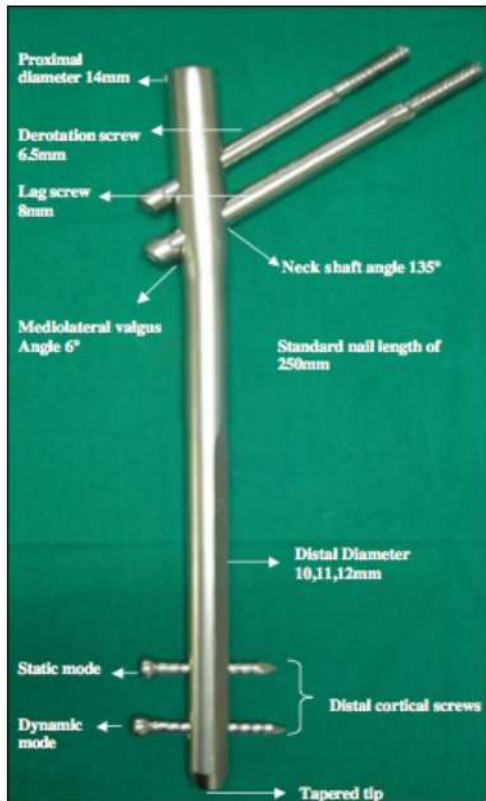
- 1) Patients who are medically fit for surgery and given written informed consent for the procedure.
- 2) Adult patients aged more than 18 years.
- 3) Patients with Intertrochanteric and subtrochanteric fractures.

Exclusion criteria:

- 1) Intra capsular Fracture neck of femur.
- 2) Patients less than 18 yrs of age.
- 3) Patients not willing for surgery, patient medically unfit for Surgery.

Patients admitted with intertrochanteric fracture and subtrochanteric fractures were examined and investigated with X-ray of pelvis with both hips AP and Lateral view.

In our study we used a standard length PFN of 250mm with distal diameter of 10,11,12 mm, the proximal diameter of the nail is 14mm. The proximal derotation screw of 6.5 mm and distal lag screw of 8mm. Distal locking done with self tapping 4.9 mm cortical screws one in static mode and other in dynamic mode allowing 5mm dynamisation. The nail is universal with 6 degrees mediolateral angulation and with a neck shaft angle of 135 degrees.



Follow up

Clinical follow up at 6 weeks, 3 months, 6 months, 12 months regarding disability and functional outcome.

At every visit patient was assessed clinically by modified harris hip scoring regarding hip and knee function, walking ability, fracture union, deformity and shortening.

X-ray of the involved hip with femur was done to assess fracture union and implant bone interaction.

3. Results

- **Age distribution:** In our series, majority of the cases i.e. 12 (40%) were in the age group of 41-60 years, followed by 9 cases in the age group 61-80 years
- **Sex Distribution:** In the present series, males were more commonly involved. Majority of the patients were males 23 (76.7%) and 7 (23.3%) were females
- **Nature of violence:** 13 cases (43.3%) affected were due to slip and fall, 12 cases (40%) due to RTA, and 5 cases
- **Side affected:** Right side is involved in 18 cases
- **Type of fracture:** Proximal femoral fractures are classified as

Type of fracture	No. of cases	Percentage
Intertrochanteric fracture	19	63.3%
Subtrochanteric fracture	11	36.7%

Immediate complications:

We had two cases of superficial wound infection which was managed by regular dressing, culture and sensitivity and appropriate IV antibiotics. No deep infections seen.

Delayed complications:

- We encountered two cases of delayed union and two cases of malunion (varus<10 degree).
- One case had shortening more than 1cms who were treated with sole rise.
- We had no cases of non union or implant failure or cutting of screws
- Two patients had knee stiffness. Patients improved after rigorous physiotherapy.

Table 1

Complications	Number of cases	Percentage
Delayed union	2	6.67%
Varus malunion	2	6.67%
Implant failure	0	0%
Non union	0	0%
Shortening of >1 cms	1	3.33%
Knee joint stiffness	2	6.67%

Functional Results

In our series of 30 operated cases two were lost follow up. Functional and anatomical results were assessed taking the remaining 28 cases into considerations using Harris Hip scoring system (Modified)
 Intertrochanteric - 18
 Subtrochanteric - 10

Table 2: Functional results of intertrochanteric fractures

Functional results	No. of cases	Percentage
Excellent	9	50%
Good	7	38.89%
Fair	2	11.11%
Poor	0	0%

Table 3: Functional results of subtrochanteric fractures

Functional results	No. of cases	Percentage
Excellent	3	30%
Good	5	50%
Fair	2	20%
Poor	0	0%

4. Discussion

The most common current modes of fixation are blade plate system, sliding screw systems and intramedullary devices. From the mechanical point of view, a combined intramedullary device inserted by means of minimally invasive procedure seems to be better in elderly patients. Closed reduction preserves the fracture haematoma, an essential element in the consolidation process. Intramedullary fixation allows the surgeon to minimize soft tissue dissection there by reducing surgical trauma, blood loss, infection and wound complications. PFN is a novel modern intramedullary implant based on experience with gamma nail.

Proximal femoral nail has all advantages of an intramedullary device such as decreasing the moment arm, can be inserted by closed technique which retains the fracture haematoma an important consideration in the fracture healing, decrease blood loss, infection, minimise soft tissue dissection and wound complications.

W.M. Gadegone & Y.S. Sulphale⁴ in 2007 reported a study on proximal femoral nail- an analysis of 100 cases of proximal femoral fractures with an average follow up of 1 year

In their study they had 95% of near normal anatomical reduction & consolidation in 16.5 weeks. Two cases had shortening of more than 1 cm.

Metin Uzun et al,⁵ in 2009, In a study of 35 patients reported long term radiographic complications following treatment of unstable intertrochanteric fractures with the proximal femoral nail and effects on functional results.

Reduction was assessed as good or acceptable in all the patients. Complete union was achieved in all but two patients. The mean Harris hip score was 82.1. The results were excellent in 11 patients (31.4%), good in 15 patients (42.9%), fair in seven patients (20%) and poor in two patients (5.7%). Radiographic complications mainly included secondary varus displacement in nine patients (25.7%). Secondary varus displacement was due to cut out of the proximal screws (n=2), screw loosening due to collapse of the fracture site (n=2), and reverse Z effect (n=5). In our study mean Harris hip score was 83.5. Radiological complications chiefly include 3 cases of varus malunion in 3 patients. We had no implant failure or reverse Z effect.

5. Conclusion

- PFN has the advantage of collapse at the fracture site and is biochemically sound as it is done by closed technique, fracture opened only when closed reduction could not be achieved and it is an intramedullary device.
- Another advantage of this device is it prevents excess collapse at fracture site thus maintaining neck length.
- The entry point determination is the most crucial step in this procedure which is the tip of the trochanter. The device is fixed distally in both dynamic and static mode so in case of delayed union it can be dynamised.
- The two neck screws should be placed in the centre of neck and head, the proximal one acts as derotation screw and the distal one as collapsing screw.
- Hence I conclude, though the learning curve of this procedure is steep with proper patient selection, good instruments, image intensifier and surgical technique, PFN remains the implant of choice in the management of intertrochanteric and subtrochanteric fractures

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