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Proximal Femoral Nailing: Results in Intertrochanteric Fractures

KEYWORDS: Proximal femoral nail, Evan's classification, Intertrochanteric fractures, Harris hip score.

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ABSTRACT *OBJECTIVES: - The Prospective study was done to access the role and effect of early weight bearing after stabilization with proximal femoral nailing (PFN) in Intertrochanteric fractures.*

MATERIAL AND METHODS- Study was conducted between August 2013 and July 2015 on 100 patients admitted in the department of orthopaedics with intertrochanteric fractures. The final outcome measurement was done according to Harris Hip Score of functional assessment.

RESULTS: - As per Evan's classification there were 10 type I fractures, 28 type II fractures, 32 type III fractures, 18 type IV fractures and 12 type V fractures. Functional outcome was evaluated by Harris hip score (HHS). 84% cases had excellent score while 10% cases had good score. The results were fair in 6% cases.

CONCLUSIONS: - PFN requires small exposure as compare to dynamic hips screw; hence there is shorter operative time, no blood loss in closed PFN, with markedly reduced morbidity. In Evans type III and Type IV fractures, intramedullary implant should be preferred.

INTRODUCTION

Intertrochanteric fractures being one of the commonest fractures in the elderly population has become a major challenge in traumatology [1]. They account for sixty percent of all proximal femoral fractures; out of this more than fifty percent are unstable [2]. Fractures of the proximal femur occur along the path of least resistance because of the complex stress configuration, nonhomogeneous osseous structure and geometry [3]. Since the elderly population withstands badly their immobilization in bed; surgical fixation of intertrochanteric fractures remains the standard of care [4,5]. However, the best method of surgical fixation is debatable. The Dynamic hip screw (DHS) has been shown to produce good results and outcomes in stable intertrochanteric fractures but complications are frequent in unstable fractures [6,7,8]. The main complication is significant shortening due to excessive collapse [9]. The proximal femoral nail being an intramedullary device provides a more biomechanically stable construct with a shorter lever arm and more load sharing [8]. The implant itself acts as a buttress against lateral translation of the proximal fragment [10]. Since this is a closed technique, there is no periosteal stripping, reduced blood loss, minimal soft tissue trauma and decreased chances of infection. The goal of this study was to evaluate the clinical and radiological results of Proximal femoral nail (PFN) for the treatment of intertrochanteric fractures.

MATERIAL AND METHODS

The study was conducted between August 2013 and July 2015 on 100 patients admitted in the department of orthopaedics with intertrochanteric fractures. Each patient was subjected to clinical and radiological examination along with routine preanaesthetic investigations. The inclusion and exclusion criteria for patients included and excluded from the study were as follows.

Inclusion criteria : 1) Patients with age more than 40 years of either sex.

Patients fit for surgery and anaesthesia.

Exclusion criteria : 1) Patients with less than 2 years of follow-up.

Pathological and compound fractures.

Pre-existing femoral deformity.

Very poor anaesthetic and general risk patients.

Patients with systemic and psychiatric illness.

Ethical clearance was obtained from the institute's ethical committee and informed consent was taken in accordance with the ethical standards of the 1964 Declaration of Helsinki as revised in 2000. All the patients were assessed pre-operatively for age, sex, fracture type (Evan's classification), mobility status, and other comorbid conditions. All the cases were operated upon as soon as possible.

Closed reduction and internal fixation of the fractures was performed using standard length titanium PFN (250 mm short nail with a shaft diameter of 9, 10, 11, 12 mm, neck shaft angle of 130° and 135°) under fluoroscopy control. The intraoperative parameters assessed were duration of surgery, amount of blood loss and complications. Antibiotics were given for 12 days and analgesics SOS. Quadriceps drill and knee mobilization exercises were encouraged as soon as the patient was in a position to tolerate. Stitches were removed on the 12th postoperative day. Partial weight bearing with help of walker was allowed at 2 to 4 weeks. Full weight bearing was allowed after 8 to 12 weeks depending upon the clinical and radiological evidence of union.

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The patients were called for follow-up at monthly interval till fracture union and then at six months interval for one year and then at yearly interval for two years. Clinical and radiological assessment was done during the follow-up. The clinical outcomes analysed were wound condition, presence or absence of pain, status of union, movement at hip and knee joint, postoperative mobilization status and subsequent return to maximum mobility, shortening, late complications and functional outcomes assessed according to Harris hip scores [11]. Radiological outcomes analysed included time of union, neck shaft angle, amount of collapse and implant related complications.

RESULTS

A total of 100 patients of Intertrochanteric femur fracture were internally fixed by proximal femoral nail. These patients were evaluated for assessment of clinical, functional, rehabilitative outcomes and complications.

In our study there were maximum number of patients in 60 - 70 age group (45%) followed by 50 - 59 age group (32%), 40 - 49 age group (23%). There is increased in incidence of trochanteric fracture with advancing age. In our series males accounted for 62% of cases while 38% were females. Higher incidence of proximal femoral fractures in male is due to their more active outdoor working. The most common mode of injury emerged as the slip on ground (63%) followed by fall from height (26%) and road traffic accident (11%). Patients above 60 years of age had fracture by simple fall. Factors responsible for this are inadequate protective reflexes, diminished local soft tissue shock absorbers e.g. muscle and fat around hip, inadequate bone strength at the hip on account of osteoporosis or osteomalacia. Hip fractures in young adults are due to high energy trauma such as road traffic accident or a fall from height while in elderly patients, it is due to low energy trauma e.g. simple falling.

The duration between injury and operation was less than 15 days in 72% of cases and in between 16 - 30 days in 28% of cases. The delay in operation was due to either late reporting to the hospital or because of other associated injuries or medical problem. As per Evan's classification there were 10 type I fractures, 28 type II fractures, 32 type III fractures, 18 type IV fractures and 12 type V fractures. Type-IV and V fractures were more common in >40 years age group showing higher rate of communition in osteoporotic bone of elderly people. In our study 95% cases were closely reduced while in 5% of cases open reduction was done as reduction was not achieved by closed methods. In the present study operation time was 1 hour in 76% cases treated by closed reduction technique. In rest 24% cases duration of surgery was about 1½ hours due to difficulty in achieving proper reduction and placement of implant. In this series knee mobilization and quadriceps drill was encouraged on next post operative day in 96% cases. Partial weight bearing with walker was allowed in 78% cases on third post operative day. (Table-1).

TABLE – 1
FOUR POST PARTIAL WEIGHT BEARING

Days	percentage
1 – 3	78
4 – 7	16
8 – 14	6
Total	100

Though PFN is a load sharing implant but we were not able to start partial weight bearing on third post operative day in 22% cases because of pain intolerance by the patient, other fracture in same limb or in contralateral limb. Full weight bearing was started at 3 weeks in 80% cases. It was delayed for 6 weeks in 20% cases because of severely communited posteromedial buttress, other fracture in same limb or in contralateral limb. (Table-2).

TABLE – 2
TIME OF UNION AND WALKING WITHOUT SUPPORT

Time of union (in weeks)	Percentage
<12	75
12 – 14	20
15 – 18	5
>18	0
Total	100

In our study there was no case of non-union but there was varus malunion in 5% cases. Z-effect was observed in 6% cases. Femoral shaft fracture at the tip of nail did not occurred in single case in our study. The neck- shaft angle was measured on the affected side and compared with the normal side as seen radiologically post-operatively and subsequently on follow-up. 5% patients presented with varus deformity. Functional outcome was evaluated by Harris hip score (HHS). Higher is the HHS, lesser is the dysfunction. A total score of < 70 is considered a poor result, 70–80 is considered fair, 80–90 is good, and 90–100 is an excellent result. 84% cases had excellent score while 10% cases had good score. The results were fair in 6% cases. (Table-3).

TABLE – 3
ASSESSMENT OF RESULTS ACCORDING TO HARRIS HIP SCORE

Results	PERCENTAGE
Excellent (90 – 100)	84
Good (80 – 90)	10
Fair (70 – 80)	6
Poor (<70)	0
Total	100

Thromboembolic complication (Deep Vein Thrombosis) was not observed in any case. Also no patient was put on antithrombosis prophylaxis in the postoperative period. In our study there was no shortening in 85% cases. A shortening of < 1cm was observed in 15% cases. In no patient there was > 1 cm of shortening. (Figures 1-3 pertaining to present study are illustrated below).

Figure-1 (a) Pre operative X-ray AP view

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Figure-1 (b) Pre operative X-ray Lateral view

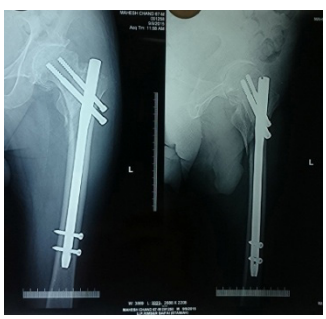

Figure-2 (a) Immediate post operative X-ray AP/Lateral views

Figure-2 (b) Six month follow-up post operative X-ray AP/Lateral views showing union

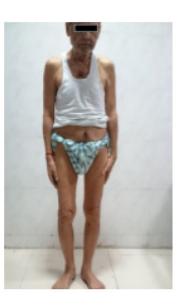

Figure-3 (a)

Figure-3 (b)

Figure-3 (c)

DISCUSSION

Unstable intertrochanteric fracture and Subtrochanteric fracture of femur have always been recognised as major challenge by the orthopaedic community, not so for achieving fracture union, but for restoration of optimal function in the shortest possible time and with minimal complications. In our study, an attempt was made to evaluate the results of proximal femoral nail in intertrochanteric fractures. A total of 100 patients of fracture Intertrochanteric femur were internally fixed by proximal femoral nail. These patients were evaluated for assessment of epidemiological, clinical, functional, rehabilitative outcomes and complications. *Fogagnolo F et al* (2008) reported 10.6% cases of intraarticular migration of screw. Implant failure and femoral shaft fracture at the tip of nail did not occurred in single case in our study. In the study of *Fogagnolo F et al* (2008) there was 1 case. Severe osteoporosis, communited fracture which were imperfectly reduced and incorrect placement of implant were found important predisposing factors of fixation failure. *Christial et. al.* (2008) reported two cut-out of screw in a series of 55 patients. The incidence of such complications can be reduced by positioning the proximal screws (ie, Antirotational screw or Stabilising screw) in centre and distal screws (ie, Lag screw or cervical screw) in inferior part of femoral neck. *Birdie, S.M. intel, A. D. Bricher, M Calvert P.T.* (1994) in a study of 100 cases of intertrochanteric fracture witnessed secondary femoral fractures in 4 patients who were managed by Gamma nail and concluded that in view of secondary femoral fractures, they did not recommend the routine use of Gamma nail. *Fogagnolo F et al* (2008) reported 1 case of femoral shaft fracture at the tip of nail in 47 operated patients. The average limb shortening was 1.4 cm in the series of *Fogagnolo F et al* (2004).

CONCLUSION

The aim of management accordingly has drifted to achieve early mobilization, rapid functional rehabilitation. Operative treatment in the form of internal fixation permits early rehabilitation and offers the best chance of functional recovery and hence has become the treatment of choice for all fracture of proximal femur. Among the various types of implants available, recently intramedullary nailing by closed techniques has gained significance. PFN requires small exposure as compare to dynamic hips screw; hence there is shorter operative time, no blood loss in closed PFN, with markedly reduced morbidity. PFN provides biomechanical advantages because the shaft fixation is nearer to the centre of rotation of hip, giving a shorter lever arm and lower bending movement on the device. In osteoporotic bones intramedullary fixation device overweigh extra-medullary plate fixation device. In Evans type III and Type IV fractures, intramedullary implant should be preferred. To achieve stability good reduction is essential. The fracture should be internally fixed only when good medial cortical contact is seen on anteroposterior view and good posterior contact is seen on lateral view. In intramedullary fixation firstly closed reduction should be tried and on its failure open reduction should be done. Bone grafting to buttress the posteromedial cortex should be done in case where good posteromedial contact was not achieved by reduction. Malrotation deformity after trochanteric fracture fixation is usually as a result of improper reduction & fixation of the fracture fragments in rotation during close reduction and intramedullary fixation. To avoid rotational deformity one should be cautious for rotation alignment of the fragment. Though incidence of non-union in intertrochanteric and subtrochanteric fracture is rare but poor operative stabilization in severe communition and unstable fractures; leads to delayed union or non union. Infection in the postoperative period is an important independent predictor of functional outcome irrespective of adequacy of internal fixation and radiological union. Proper theatre sterilization, adequate antibiotics and sterilized dressing under a septic condition deserve special attention. We have observed that PFN has proved to be more useful in simple intertrochanteric fractures as well as in difficult trochanteric fractures with a Subtrochanteric extension up to 2 cm. It is not suitable for subtrochanteric fractures.

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