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Effectiveness Of Proximal Femoral Nail In Treating Proximal Femoral Fractures. An Experience On 20 Cases.

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ABSTRACT

Surgical management is the method of choice of treatment of proximal femoral fractures. Proximal femoral nail is suggested to have more chance of success in these fractures. We treated 25 adult patients with proximal femoral fractures in the age group of 25-76 years. Surgery was done by closed method in most cases and by open reduction in cases where surgery is delayed from co morbid conditions. In a follow up , the outcome was excellent too good in 65% of patients, fair in 5% and poor in 15% patients. Three cases had superficial infection and two had deep infections which settled with antibiotics . There was one cut of the anti-rotational screw and two fracture of the shaft . these cases needed revision surgeries. We did not have any Z effect or reverse Z effect. Most patients had either no pain or slight pain which did not affect their activities. Only one patient had severe pain. In proximal femoral fractures, Proximal femoral nail gives acceptable results.

Keywords: Proximal femoral fractures, PFN, union, reduction , fixation

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INTRODUCTION

Proximal femoral fractures happen very commonly in recent times. This is mainly due to increase in two-wheeler traffic [1]. This renders the patient to be maimed for life if not properly treated. There is no place for conservation in this fracture. ² Various fracture fixation devices are used to treat the fracture including DCS, PFLCP, and Reconstruction nail. The recent addition is the PFN. Proximal femoral nail offers comparatively good axial stability and biomechanical strength than another implant. The main draw-back of the implant is the stress fracture that happens at the end of the implant. We aimed to evaluate whether theoretical advantage could be proved in practice, for unstable proximal femoral fractures.

MATERIALS AND METHODS

Between April 2016 and 2018, a prospective control study was conducted with ethical committee clearance number 393 with the first and second authors as guides and the third author as the investigator. 20 consenting proximal femoral fracture patients were treated with Proximal femoral nailing. All these cases were injured in vehicular accidents. All these patients were ambulant before injury. There were 15 sub-trochanteric fractures and ten inter trochanteric fractures. All these patients were assessed for surgery with blood investigations and physician opinion. All were found fit for surgery. Youngest patient in this study 25 years old and eldest is 76 years. Most patients in this study were of elderly age group and mean age 48.5years. Of these subtrochanteric fractures due to osteoporotic bone quality were more in females with low velocity and more subtrochanteric in male with high velocity. Mean injury -operation interval in this study is 19.45 days mainly due to increased time taken to optimize uncontrolled pre-existing illness at time of presentation. Intraoperative reduction of fracture was achieved through closed means in 35%. In 65%case patient had comorbidites condition with more time lag needed open reduction. The patients were given suitable anaesthesia- spinal anaesthesia and positioned in table. The trochanteric entry point was made using a cannulated awl.



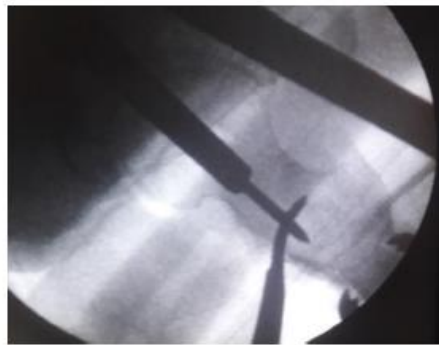
A case of subtrochanteric fracture (pre operative- radiograph)



Entry point



Entry point antero posterior view



Entry point lateral view

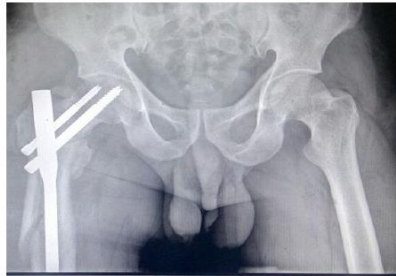


Passing the guide wire and reduction of the subtrochanteric fracture



Passing of the nail over the guide wire after reduction of the subtrochanteric fracture

Drilling of the proximal fragment was done. Fracture was reduced by traction, manipulation by a Schantz screw or by the reamer handle. The guide wire was passed into the distal fragment and reaming of the distal fragment was done. A nail of suitable diameter is passed in antegrade manner –proximal locking was done. The fracture was impacted, and then distal locking was done. This fracture fixation was confirmed with image intensifier images. Intra -operatively there was few difficulties of obtaining closed reduction. This resulted in blood loss requiring transfusions. However, in our later cases this was overcome by early surgery. All these cases were followed up with radiographs for a period of 20 months. All cases were available for follow up.



Post operative pelvis radiograph

All these cases united. In our initial cases we had difficulty in this was overcome later. Whether open reduction or closed reduction did not have any bearing on the results as assessed by Harris Hip Score. Another case is illustrated in figure 1



Preoperative radiograph showing sub trochanteric fracture



Post-operative radiograph showing sub trochanteric fracture fixed with PFN



Post-operative clinical photo radiograph showing sub trochanteric fracture fixed with PFN



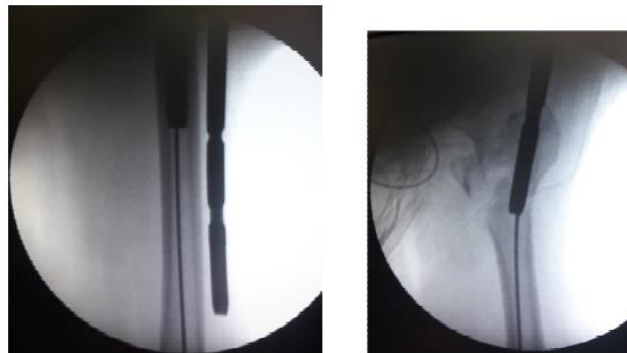
Six month follow up radiograph showing sub trochanteric fracture fixed with PFN united

Table 1. Details of all cases treated with proximal femoral nail.

S.no	Age sex	Classification	Co morbid	Blood loss	Reduction	Harris Hip Score
1	50/F	IIB	Anaemic	>1000ML	OPEN	90
2	69/M	IIIA	Nil	- 1500ML	OPEN	80
3	64/M	IIA	Nil	<1000ML	OPEN	100
4	44/F	IIIA	Malnourished	<1000ML	Open	80
5	76/M	V	Bronchial asthma	<700ML	CLOSED	75
6	45/F	IIIA	Elephantiasis	>1000ML	OPEN	100
7	40/M	IIB	Nil	>1200ML	OPEN	100
8	58/M	IIIA	Nil	>1000ML	OPEN	60
9	24/M	IIIB	Nil	>1500ML	OPEN	90
10	45/F	IIB -	Nil	<1000ML	OPEN	90
11	65/F	IIB	DM	>1000ML	OPEN	88
12	25/M	IIB	Alcohol withdrawal	>1200ML	OPEN	100
13	50/F	IIIA	Nil	>1000ML	OPEN	97
14	65/F	IIB	Paget disease of bone	800ML	OPEN	40
15	40/M	IV	Nil	1500ML	OPEN	40
16	35/M	IIB	Nil	300ML	CLOSED	100
17	21/M	IIA	Nil	400ML	CLOSED	100
18	46/M	V	Hypertensive	600ML	CLOSED	97
19	44/M	IIC	Thin SDH	<400ML	CLOSED	97
20	45/M	IIB	Epilepsy	<400ML	CLOSED	97



50 years female with left side trochanteric fracture



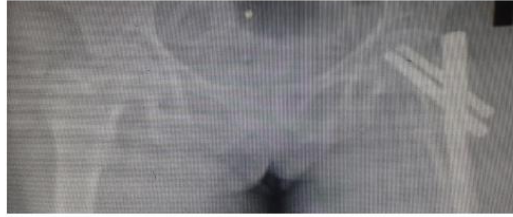
Intra operative c-arm image pictures.



Post-operative pictures showing the operative wound



Immediate post operative radiograph



One month follow up the valgus is maintained



Six months follow up showing union of the fracture maintaining the valgus .

RESULTS

In the present series, 15% (3) of cases had superficial infection and 10% (2) deep infections were recorded. Cut out of the anti-rotational screw was noted in one patient.

Fracture of the shaft was noted in 10% (2) of patients. We did not have any Z effect or reverse Z effect. Majority of the patients (35%) in this study had either no pain or slight pain which did not affect their activities. Only one patient had severe pain. 15% (3) of patients had mild pain which was relieved with analgesics. In the current study majority of patients had no or slight limp that did not affect their activities. 15% (3) had a mild painless limp which was mainly due to shortening. In this series, 30% (6) of patients could climb stairs with any support but 45% (9) required normally without using the support of railing. Four patients were unable to climb the stairs. This difficulty was commonly seen in geriatric age group patients. For activities of daily living, squatting was possible in 35% (7) with ease and with some difficulty in 45% (9 cases). Four patients were not able to squat. This was primarily noted in old patients with osteoarthritis. Only 4 patients were able to sit cross legged with ease (20%), while 55% (11) had some difficulty in sitting cross legged. However, 5 elderly patients were unable to sit cross legged mainly because of associated osteoarthritis of knee.

In the current series, the mean Harris Hip score was 81.05 and it was ranging from 100 - 40. Overall result depended on the age group of the patient. In this series all the patients between 31 – 45 years had excellent result irrespective of the type of fracture. Older age group patients had relatively poor results and 15% (3) of them had poor results and another 20% (4) had good to fair results. In this study excellent outcome was not seen in the older age group patients.

DISCUSSION

Studies on the biomechanics of Proximal Femoral Nail (PFN) have showed a significant reduction of distal stress and an increased stability, a relatively low percentage of complications and low incidence of implant failure compared with the Gamma Nail [3-5]. When a prospective randomized study was done on 206 patients comparing Dynamic Hip Screw was compared with PFN there was definite advantage in PFN [6]. PFN is found to be an useful treatment option for subtrochanteric fractures because of low rates of femoral shaft fractures and failure of fixation associated with this implant [7]. In another study it was found that PFN is a good minimally invasive implant for unstable proximal femoral fractures [8]. Thus a good reduction with minimal dissection, use of appropriate length of nail and proper positioning of the nail and screws are necessary to avoid failure or revision with Proximal Femoral Nail [9]. A comparative study by, on Proximal Femoral Nail and Gamma Nail for reverse oblique trochanteric fractures reported better biomechanical results with PFN group, in terms of less sliding of lag screw and less change of neck shaft angle [10]. Another study concluded that lesser trochanteric fragment and postero-medial defect played an important role in the stability after intra-medullary hip nailing and attributed the fixation failures in the PFN group to excessive sliding of the femoral neck screw [11].

In this series 45% of the fractures were due to domestic falls and this can be explained by the higher mean age group of the patients in this study. Vehicular accidents caused the remaining 55% of subtrochanteric fractures in this study. Seinsheimer's classification and type II B fracture pattern constituted the highest percentage 45 of all fracture patterns. Admission –to operation interval in our study varied from 10-29 days; mean interval was 19.45 days. This is due to elderly patients pre-existing had uncontrolled medical problems. Intra operatively fracture reduction was achieved by closed means in 35% of patients and Open mean in 65% patient with delayed injury – operation interval, The reduction was good in 65%, acceptable in 15% , poor in 4 cases 20%. 10% encounter any deep infections in our series.

Cut out of hip screw was noted in 1 patient due to a fall in the post-operative period. 1 patient had fracture shaft of femur with breakage of the nail noted at the distal locking screw hole that was not locked. These problems were seen in other series also [12, 13].

The fractures in this series united in an average period of 1.9 months while it took approximately 4 months in other series [12. 13]. 25% of the patients in our series had no or slight pain that did not affect their activities. Only 1 patient who had cut out of the anti-rotational screw had severe pain that restricted her activity significantly.

63 % of these patients had no or slight limp. 55% of the patients can move without any walking aids. A cane was needed for long walks in 20%of patients and most of the time in 19.04% (4) of patients. Only one patient required crutch for mobilization. Difficulty squatting and sitting cross legged noted in 47.6%(10) of patients. Most of these patients were of geriatric age group who had associated degenerative disease of the knee.

Limb length discrepancy was noted in 3 patients with Seinsheimer's type IV and type V fracture patterns of which 2 had shortening of more than 1 cms.

Final outcome was excellent to good in 65% of patients, fair in 5% and poor in 15% patients. Younger age group patients irrespective of their fracture pattern had excellent outcome in this series. Most of the poor results were seen in the elderly age group patients with associated Osteoarthritis of the knee. The mean Harris Hip score was in our series was 81.05% which was higher than I.B.Schipper's series¹³ where the mean was 77.6. Non-union of subtrochanteric fractures is rare and may result from poor stabilisation with later varus collapse and screw out through femoral head or due to an osseus gap secondary to inadequate fracture fixation and impaction.

The main claimed advantages with pfn is that it needs a small incision, lesser blood loss, short operating time, less morbidity in closed reduction. PFN may provide mechanical advantage as shaft fixation is nearer to centre of rotation at the hip joint, giving a short lever arm and lower bending stress on device; thus it is biomechanically sound device.

In osteoporotic bone, PFN provides definitive advantage as periosteum callus formation in linear manner. Malunion and deformity after trochanteric fixation is usually a result of improper fixation of fracture fragments in rotational at time of surgery.

If fracture is managed by closed methods then, incidence of malrotation and deformity is found to be less as with our patients who had early surgery. In this study we found to that PFN prove to be useful in difficult subtrochanteric fractures with extension into femur. The rotational stability was higher and the design with a central axis position of screw in nail is probably optimal for subtrochanteric fractures.

CONCLUSION

In this study patients with unstable proximal femoral fractures ,including subtrochanteric fractures and the trochanteric fractures , managed by early operative intervention fixed with long PFN allowed early rehabilitation ,offered the patients, the best chance for functional recovery. PFN can be considered as a choice for all proximal femoral fractures.

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