

A STUDY ON SURGICAL MANAGEMENT OF INTERTROCHANTERIC AND SUBTROCHANTERIC FRACTURES OF FEMUR BY PROXIMAL FEMORAL NAIL

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ABSTRACT: AIMS AND OBJECTIVES: To study the various fracture patterns, mechanism of injury, operative difficulties encountered, result in terms of radiological union and ultimate functional outcome of intertrochanteric and subtrochanteric fractures of femur treated by proximal femoral nail. **RESULTS:** In the present study, 22 cases of subtrochanteric and intertrochanteric fractures of proximal femur treated by proximal femoral nail at Govt. General Hospital, Kurnool from August 2010 to July 2012 were included. Out of 22 cases, 18 were subtrochanteric and 4 were intertrochanteric fractures. In subtrochanteric fractures, seinsheimer type III were 44.4%, in intertrochanteric fractures even's unstable fractures were 75%. The mean age group was 45 years with males 82%, right side femur were involved in 55%, road traffic accidents accounted for 55%, associated injuries found in 36%. Mean duration of hospital stay was 16.83 days, union was achieved in 86.6% with mean time for union was 12.75 weeks. Hip joint stiffness was found 23% and non-union in 4%. **CONCLUSION:** By the analysis of data collected in the present study, proximal femoral nail is an effective device in the management of complex proximal femoral fractures. It offers superior stabilization and good fracture union.

KEYWORDS: femur, subtrochanteric, intertrochanteric, proximal femoral nail.

INTRODUCTION: Fractures around the trochanteric region of femur are one of the commonest fractures encountered in orthopaedics and also the most devastating injuries of the elderly patients. In younger patients the fractures usually result from high energy trauma like RTA and fall from height and accounts for only ten percent.¹

Since the femur is the longest and the strongest bone in the body and one of the principal load bearing bone in the lower extremity, fracture of this bone may result in prolonged morbidity and extensive disability unless the treatment is appropriate. The goal of treatment is to limit pain and to help the patient return to the level of activity prior to sustaining the fracture. Until 1960's non-operative treatment was the option available for these types of fractures in the form of traction with prolonged bed rest with fracture healing occurring in ten to twelve weeks. (usually)

Surgery is the mainstay of treatment. The goal of treatment is fracture reduction so that near anatomic alignment and normal femoral anteversion are obtained.² The primary reason for surgery is to allow the early mobilization of the patient, with partial weight-bearing, restrictions depending on the stability of the reduction.³ The most common internal fixation device used today is the fixed angle extramedullary device, such as a 95-degree lag screw and side plate or

blade plate. The disadvantage is shortening and rotation at the fracture site.⁴ Other method of fixation is intra medullary fixation with devices like the IMHS (intra medullary hip screw), Gamma nail, Russell - Taylor reconstruction nail, ATN (Ante grade trochanteric nail), TFN (Trochanter fixation nail) and the PFN (Proximal femoral nail). Advantages of intramedullary devices include retained blood supply to the bone fragments, less operative blood loss and less disruption of the soft tissues.

This study consists of 22 cases of pertrochanteric (intertrochanteric and subtrochanteric) fractures which were fixed with proximal femoral nail and their final outcome.

MATERIALS AND METHODS: During the period between August 2010 to July 2012, 22 patients who were admitted in department of orthopaedics, government general hospital, kurnool with proximal femoral fractures that fitted into the inclusion criteria and were treated surgically with proximal femoral nail were included in the study.

Inclusion criteria includes all proximal femoral fractures including intertrochanteric and subtrochanteric region, age >20years. Exclusion criteria includes age less than 20 yrs, compound fractures, previous wound or bone infections, operatively treated fractures, or retained hardware in the same extremities. Radiograph of pelvis with both hips ap view and affected hip lateral view are taken. Immobilization of affected extremity in BB splint by skin traction and if surgery is delayed, then skeletal traction is used. All the routine investigations were done as follows haemogram, blood urea, serum creatinine, urine routine, microscopy, blood sugar level, serum electrolytes, blood group, HIV, HBsAg, HCV, Chest X-ray and ECG. Specific investigations of all associated medical illness were carried out. Pre op anaesthetic and physician fitness were done. These cases are studied on the basis of mechanism of injury, classification and treatment with proximal femoral nail and their surgical and functional outcome with or without residual complication.

The end results were evaluated in terms of clinical parameters, wound healing, complications & subsequent procedures, fracture union, mobilization status, range of motion, hip and knee and resumption of activities.

RESULTS: The following observations were made from the data collected during the study of proximal femoral nail in the treatment of 22 cases of subtrochanteric and intertrochanteric fractures of proximal femur in the Department of Orthopaedic Surgery, Kurnool Medical College and Govt. General Hospital, Kurnool from August 2010 to July 2012.

In this study, maximum age was 65 years and minimum age was 24 years and mean age group was 45 years. Sex distribution in this study was 82% males and 18% females.

In this study, majority of the cases were due to RTA (55%) and self-fall (27%) and minority of the cases were due to other causes. In this study twelve patients (55%) were injured on right side and ten (45%) on left side.

In our series, fourteen of the patients (64%) were not associated with any injuries and eight of them (36%) were associated with fractures and other injuries.

Seinsheimer's classification was taken into account for sub-trochanteric fractures, while evan's for intertrochanteric fracture was considered in this study. There were 9% type IIc

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fractures, 36% type III fractures, 9% type IV fractures and 18% type V fractures. 27% were Intertrochanteric fracture out of which 25% were stable and the remaining unstable.

In this study mean time interval between trauma and surgery was one week. In our series 16 patients underwent closed nailing and 6 patients underwent open nailing. The average operative time was 90 minutes and average duration of x-ray exposure was 100 seconds, and mean blood loss was 130ml.

In this study, In one case we experienced jamming of the drill sleeve and in one case we had guide wire breakage, and in one failure of distal locking. In this study, in the immediate post-operative period we had no complications. In delayed complications we had one case of implant breakage, 3 cases of delayed union and one case of non-union. We had shortening of 1.5 cms in one case and one case of secondary infection. Hip joint stiffness is seen in 5 cases (23%).

In this study the mean time of full weight bearing was 12.75 weeks, average duration of hospital stay was 16.83days.

All patients were followed at 6 weeks, 12 weeks, 6 months and some patient's upto one year and further if necessary. At each follow up, radiograph of operated hip with upper half femur was taken and assessed for fracture union and implant failure and screw cut out. In the present study different fractures took different period of time for union. Mean period of union was as follows for seinsheimer Type IIc- was about 3 months, Type III- was about 3 months, Type IV- was about 4 months, Type V - was about 4 months, Intertrochanteric stable fracture – was about 2 months, intertrochanteric unstable fracture was about 3 months. The mean period of union in our study was 12.75 weeks.

In this study the union rates were 86.6% and one patient had shortening of 1.5 cms, three patients had knee joint stiffness and five patients had hip joint stiffness. In this study of 22 operated cases, no deaths reported during the study period.

The results of the treatment of intertrochanteric and subtrochanteric fractures using Proximal Femoral Nail were assessed by HARRIS HIP SCORE system (Modified).12 cases(54%) has good score, 5 cases(23%) has fair score, 3 cases (14%)has poor score while 2cases(9%) has excellent score.

DISCUSSION: An accurate reduction and proper surgical technique is of greatest importance in the treatment of unstable trochanteric and subtrochanteric fractures with the PFN. PFN is a novel, modern intramedullary implant based on experience with the gamma nail. The gamma nail has technical and mechanical failure rates of about 10% and is susceptible to fail at the lag screw-implant interface which is its weakest point.

The AO ASIF in 1996 developed the proximal femoral nail which has an anti-rotational hip pin with the smaller distal shaft diameter which reduces stress concentration to avoid these failures. The advantages of Proximal femoral nail are, it decreasing the moment arm, can be inserted by closed technique, which retains the fracture haematoma which is important in fracture healing, decreased blood loss, decreases infection, minimizes soft tissue dissection and wound complication.

An intra-operative fracture displacement during manual introduction of the nail into the femoral shaft has been a problem with the PFN. The reason may be that the entry point of the

PFN at the tip of the greater trochanter is located directly in the fracture region which can cause an intraoperative fracture displacement. However, Simmermacher et al. had no cases of intraoperative fracture displacement using the PFN.⁵ In our study we did not encounter any intraoperative fracture displacement after nail insertion. In comparison to gamma nail, we did not encounter neither any fracture of the femoral shaft or any break in the implant, intraoperatively.

In this study, subtrochanteric and intertrochanteric fractures were more common due to Road Traffic Accidents and self falls. In this study we have chosen the age group from 21 years upto 65 years of age, we had range of patients from 24 years to 65 years with the mean age of 45 years. The maximum no. of cases (8 cases – 36%) were found in the age group between 51 to 60 years and minimum no. of cases were found in the age group of 41- 50 years (2 cases – 9%), as compared to the mean age of 69 years in a study conducted by Pavelka T et al.⁶ They have bimodal distribution occurring in the elderly due to low mechanism injury such as Minor fall and high energy mechanism such as RTA, fall from height. Most of the patients in our study fall in the age group of 51 – 65 years (45%).

Males were more common affected than females, males accounting to 18 cases contributing to 82 % of cases and females contributed to 4 cases making 18% of cases, as compared to 40.1% male patients and 59.86% of female patients, in a study conducted by Pavelka T et al.⁶

Right sided fractures were slightly more than left sided fractures accounting to 12 cases, which made for 54.55 % of cases and left sided fractures accounted for 10 cases making 45.45% of cases.

In the study conducted by B Kanthimathi et al the mean age was 46 years, males were 64% and females 36%, right side was affected in 60% and left side in 40%.⁷

In this study, subtrochanteric fractures were eighteen cases, in which Seinsheimer type III and type V contributed eight and six cases in each group, making to 36 % and 26% followed by type IIC & IV contributing to 2 cases each making to 18%. The intertrochanteric fractures were four cases in which one case (4%) was stable fracture and three cases (14%) were unstable according to Evans classification.

We performed closed procedure in 16 cases (73%) and open nailing in 6 cases (27%). The mean duration of radiation exposure was 100 seconds, mean duration of surgery was 90 minutes and mean blood loss was 130 ml with 14% intraoperative complications. In the intraoperative period, in one case we had jamming of the drill sleeve and in one case we had breaking of the guide wire, however, the jammed drill sleeve was removed and operation was continued using another drill sleeve and in case of guide wire breakage, it was removed successfully and we did not put hip screw in 8 cases and distal locking was not done in one case.

In the study conducted by I. B. Schipper et al the mean operating time was 60 minutes and open reduction was required in 8.1% with mean blood loss of 220 ml. seven cases showed local intraoperative complications (3.3%). Problems with insertion of the hip screw(s) and perforation of the femoral head and converging of the K-wires.⁸

In the study conducted by B Kanthimathi et al the mean operative time was 71.5 minutes, closed nailing was performed in 78% and open nailing in 22%.

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In the study conducted by Pavelka T et al the average operative time was 56 min and X-ray exposure lasted on average 1 min. We recorded 14 intra-operative complications in nine patients, which included incomplete reduction in four cases, fixation in distraction in two, incorrect length of screws in one, fracture at the site of distal locking in two and incorrect insertion of femoral neck screws in five cases.⁶ Early post-operative complication involved seven cases and late complications occurred in two patients.

The mean duration of hospital stay was 16.83 days; mean time for full weight bearing was 12.75 weeks. Post operatively all patients were ambulatory of which two of them required walking aids. One patient had 1.5 cms shortening after fracture union which was treated conservatively by sole rise. All patients enjoyed good range of hip and knee motion except four patients had hip restrictions and three patients had knee restrictions of movements.

In the study conducted by I. B. Schipper et al the mean duration of hospital stay was 21.7 days. In the study conducted by B Kanthimathi et al the mean weeks of fracture union was 12.6 weeks and complication rates were 20%. One patient had varus deformity of less than ten degrees and no attempt was made to revise. Fracture union was uneventful. One patient had wrong placement of distal locking screw.⁸ In this study, no deaths were reported during the study period.

In the series of conducted by Christophe sadowski, Anne Lubekke, Marc Saudan, Nicolas Riand and others, 20 patients of proximal femoral fractures were treated by PFN.⁹ In the series conducted by Boldin C, Seibert FJ, Fankhauser F and others, 34 patients of unstable proximal femoral fractures were treated by PFN.¹⁰ In the series conducted by Schipper, Steyerberg, Castelein and others, 210 patients of proximal femoral fractures were treated by PFN, and they could in all assess 144 patients.⁸ According to Hip Harris Score (Modified), overall 9% of patients had excellent results, 54 % of patients had good results, 23 % of patients had fair results and only 2 cases i.e., 14% of patients had poor results. In the series of conducted by I. B. Schipper, E. et al in Treatment of unstable trochanteric fractures the mean Hip Harris Score was 77.6 and in this series the Hip Harris Score was 81.5.

CONCLUSION: In this study conducted on 22 patients, for subtrochanteric and intertrochanteric fractures treated with proximal femora nail, mean age group was 45 years, with sex distribution 82% males, road traffic accidents associated with 55%, union rate was achieved in 86.6% with mean period of union at 12.75 weeks, delayed union in 9%, non-union in 4%

By the present study PFN is an effective device in the management of complex femoral fractures. Use of PFN in such fractures provides various advantages: Closed procedure, Minimal soft tissue damage, No stress risers in bone, Closer to weight bearing axis. It offers superior stabilisation than other currently used methods of internal fixation. The use of PFN is technically demanding and needs expertise. Complications can be avoided by proper operative technique. Early post-operative mobilisation and physiotherapy improves the results of PFN.

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Figure 1



Figure 2

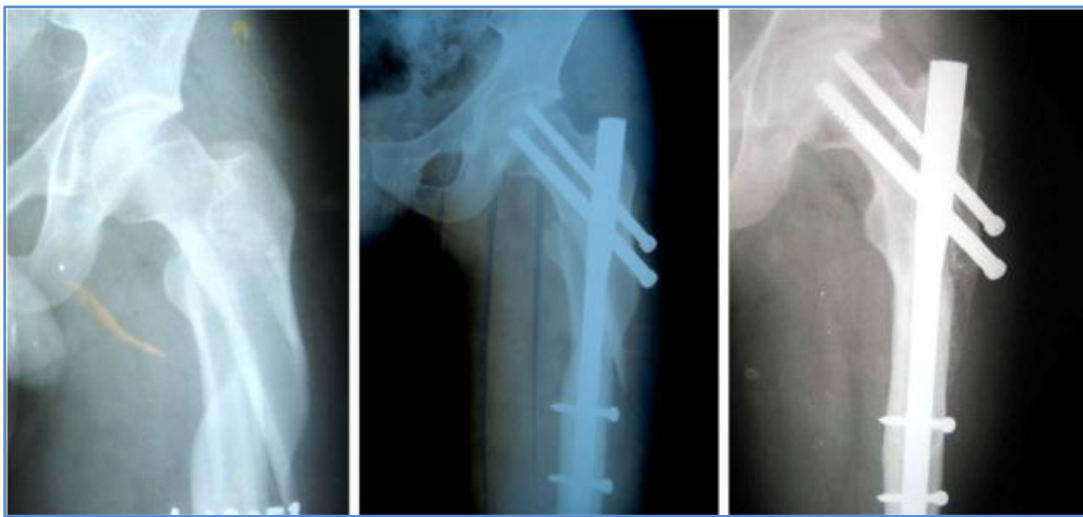


Figure 3

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