

Functional outcome of Peritrochanteric fractures fixed with Proximal Femoral Nail in a Tertiary Rural Centre

Dr Anil kumar Gulia¹, Dr S. L. Munde², Dr Virender Chaudhary³, Dr Dharvin Lamba⁴,
Dr Karan Siwach⁵, Dr Sanjiv Kumar⁶, Dr Sidhath Baheti⁷, Dr Upender Sheoran⁸

^{1,6}Assistant professor, Department of Orthopedics, BPS Govt. Medical College For Women Khanpur Kalan, Sonapat, Haryana.

²Associate Professor, Department of Orthopaedics, BPS Govt. Medical College For Women Khanpur Kalan, Sonapat, Haryana.

³Ex-SR, Department of Orthopaedics, BPS Govt. Medical College For Women Khanpur Kalan, Sonapat, Haryana

^{4,7}SR, Department of Orthopaedics, BPS Govt. Medical College Khanpur Kalan, Sonapat, Haryana

⁵Ex JR, Department of Orthopaedics, Department of Orthopaedics, BPS Govt Medical College Khanpur Kalan, Sonapat, Haryana

⁸JR, Department of Orthopaedics, BPS Govt. Medical College, Khanpur Kalan, Sonapat, Haryana

ABSTRACT

Background and objectives: Peritrochanteric fractures are devastating injuries that most commonly affect the elderly population and also the young. Peritrochanteric fracture is a leading cause of hospital admissions in elderly people. The number of such admissions is on a raise because of increasing life span and sedentary habits. Conservative methods of treatment results in malunion with shortening and limitation of hip movement as well as complications of prolonged immobilization like bed sores, deep vein thrombosis and respiratory infections. This study is done to analyze the surgical management of Peritrochanteric fractures using Proximal Femoral Nail.

Methods: This is a prospective study of 60 cases of trochanteric and subtrochanteric fractures admitted to BPS Government Medical College, Khanpur Kalan between July 2012 to December 2013. Cases were taken according to inclusion and exclusion criteria i.e., patients with Peritrochanteric fracture above the age of 18yrs and post traumatic peritrochanteric fractures. Patients with polytrauma, compound fractures, old complicated fractures and pathological fractures were excluded from this study.

Results: In our series of 60 cases there were 45 female and 15 male, maximum age of 90 yrs and minimum age of 23 yrs, most of the patients were between 30 to 65 yrs. Mean age of 52.3 yrs. 70% of cases were admitted due to low energy trauma and with predominance of right side. Out of 60 cases, 18 were intertrochanteric and 42 were subtrochanteric. In intertrochanteric fractures 83.3% were Boyd and Griffin type 2, 16.67% were B type 3 and in Subtrochanteric fractures 7.1% were type 1, 21.4% were Sinsheimer type 2a, 28.6% were 2b, 21.4% were 3a, 7.1% were type 3b and 14.3% were type 4. Mean duration of hospital stay is 11.67 days and mean time of full weight bearing is 16.3 wks. Excellent results were seen in 50% cases, good in 33.3% cases, fair in 16.7% in intertrochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3%, good in 21.4% cases and fair were seen in 14.3%.

Conclusion: The main objective of the management of elderly patients with peritrochanteric fractures is a successful return to safe mobility. In our experience use of PFN in the treatment of peritrochanteric fractures produces better results. Good anatomical reduction with posteromedial cortical contact & placement of screws as discussed will prevent complications.

Keywords: PFN (Proximal femoral nail), Peritrochanteric; Subtrochanteric; Trochanteric fractures.

INTRODUCTION

Peritrochanteric fractures are devastating injuries that most commonly affect the elderly and also in young, have a tremendous impact on both the health care system and society in general. Rapid industrialization & automobile use is increasing their incidence. Usually they are seen from 5th decade of life onwards[1,2] Osteoporosis, sluggish reflexes, diminishing vision are common associated factors in this age group[3], but now a day's following Road Traffic Accidents(RTA) these fractures are often seen in younger population.[5] Conservative management is poorly tolerated by elderly patients & it is associated with complications like decubitus ulcers, Deep Vein Thrombosis, Aspiration Pneumonitis, Malunion, limb shortening.[1,3,4,5]

The type of implant used has an important influence on complications of fixation. Sliding devices like the Dynamic Hip Screw (DHS) and Intramedullary devices like the proximal femoral nail (PFN) have their own advantages & disadvantages and various meta-analysis conducted so far have come out with conflicting results regarding superiority of PFN over DHS. For unstable peritrochanteric fractures, further intervention is needed because of the risks of postoperative deformities and cut-out of the lag screw.[6,7]

Biomechanically, compared to a laterally fixed side-plate, an intramedullary device, decreases the bending force of the hip joint on implants by 25 to 30%. This has advantages especially in elderly patients, in whom the primary treatment goal is immediate full-weight-bearing mobilization. [8]

This study was conducted to determine the suitability of PFN - as an appropriate method for minimal invasive treatment of peritrochanteric & subtrochanteric femoral fractures which can be difficult to manage particularly in noncompliant and elderly patients having high rate of implant failure and other complications.[9]

MATERIAL AND METHODS

66 adult patients with fresh peritrochanteric fractures reporting to emergency and outpatient department of BPS Government Medical College, Khanpur Kalan, Sonapat, between July 2012 to December 2013 were included in a randomized prospective study. After Institutional Ethics Committee approval for this study, written informed consent about participation in study was taken from every patient or relative. 6 patients were excluded from study as they were lost in follow-up.

Adult patients above 18 years with fresh closed fractures were included. Patients with polytrauma, compound fractures, old complicated fractures and pathological fractures were excluded from this study. The patients were randomly selected and divided into two groups: 18 patients of intertrochanteric fractures and 42 patients with subtrochanteric fractures. All necessary clinical and radiological evaluation was done and investigations required for anaesthetic fitness were done. Intertrochanteric fractures were classified according to Boyd and Griffin classification and subtrochanteric fractures according to Seinsheimer Classification.

All cases were operated in lateral position without fracture table and image intensifier was used in all cases. It is very important to reduce the fracture to near anatomical approximation both in Anterior Posterior & Lateral views to help us 1). To put the screws in the proper position and 2). To get good postero-medial cortical contact before nailing. This gives adequate stability for the fracture Metin et al [10]. Standard Proximal Femoral Nail (PFN) was used in this study. The distal end is flexible with fluting of the nail tip to reduce the stress and therefore the low energy fracture at the tip. There is an anatomical 6° mediolateral bend which is situated 11 cm distal from the top of the nail. Two screws can be inserted through the proximal part; 11 mm neck screw and 6.5 mm antirotational screw. Distal locking is by 4.9 mm locking bolt which can be static or dynamic. Patients were encouraged to sit in the bed after 24 hours after surgery. Patients were taught quadriceps setting exercises and knee mobilization in the immediate post operative period.

All patients were followed up at an interval of 4 weeks till the fracture union is noted and then after once in 6 weeks till 1 year. At every visit patient was assessed clinically regarding hip and knee function, walking ability, fracture union, deformity and shortening. Weight bearing was gradually increased as per the radiological evaluation of the fractured site. X-ray of the involved hip with femur was done to assess fracture union and implant bone interaction. Modified Harris Hip scoring system was used for evaluation. [11] Data was analyzed by descriptive statistics as Mean, Standard deviation, percentage, & proportions etc. Comparison was done by applying Z test of proportion & P value of less than 0.05 was considered as significant.

RESULTS

In our series, majority of the cases i.e. 36 (60%) were in the age group of 50- 90 years, followed by 24 (40%) cases in the age group 20-50 years. The youngest patient was 23 years old and eldest patient was 92 years. The mean age was 52.3 years. Right sided fractures were more common in our study accounting for 60% of cases. Majority of the patients were females – 45 cases (75.0%) and 15 cases (25.0%) were males.

Table 1 : Patient and fracture profile

S.No.	Patient / Fracture Profile	Total (n=60) / %
1	Total No. of Patients: Male Female	60 15(25%) 45(75.0%)
2	Mean Age(Years)	52.3 yrs
3	Mode of Injury: High energy trauma RTA Fall from Height Low energy trauma- due to slip and trivial fall	 15(25%) 3 (5%) 42 (70%)
4	Fracture type Intertrochanteric Subtrochanteric fractures	 18 (30%) 42 (70%)
5	Pre- operative fracture age (days)	6
6	Duration of surgery <1 hour 1-2 hours	12 48
7	Fracture reduction Anatomical acceptable	80% 20%
8	Average Blood loss (ml) Intraoperative	100ml
9	Average hospital stay (in days)	11.67

Mode of injury in 15 cases (25%) were due to slip and trivial fall, 42 cases (70%) due to RTA, and 3 cases (5%) due to fall from height. RTA was the most common mode of injury. In our study 18 cases were Intertrochanteric and 42 cases were subtrochanteric fractures. In intertrochanteric fractures 15 (25%) were Boyd and Griffin type 2, 3 (5%) were type 3 and in Subtrochanteric class, 3 (5%) were Seinsheimer type 1, 9 (15%) were type 2a, 12 (20%) were type 2b, 9 (15%) were type 3a, 3 (5%) were type 3b and 6 (10%) were type 4. Two patients had closed head injury and were managed conservatively. 4 patients had fracture shaft tibia, 6 patients had distal radius fracture, 4 of them were treated with closed reduction and below elbow cast application and 2 by closed reduction and internal fixation with K-wires. The patients were operated with a minimum post traumatic duration of 2 days to a maximum of 11 days with an average interval of 6 days. Mean duration of surgery was 75 minutes. Duration of surgery was more for the initially operated cases. More in cases of subtrochanteric fractures when compared to trochanteric fractures and in fractures where we had to do open reduction. Average blood loss measured by mop count was 100ml.



Figure 1: Preoperative and postoperative of Intertrochanter fractures

In 10% (n=6) open reduction was done due to comminuted fracture, in 6.68% (n=4) cases we failed to achieve anatomical reduction due to posteromedial fragment. In 10% (n=6) we failed to put derotation screw due to zig mismatch and in two cases (3.34%) fixation of fracture in varus angulation. Distal locking difficulty was encountered in 8.35% (n=5).



Figure 2 : Union of fractures

We had two cases of superficial wound infection post operatively, which was managed with regular dressing, culture and sensitivity and appropriate antibiotics. No deep infection was seen. 8.35% (n=5) had delayed union and varus malunion was seen in 3.34% (n=2) cases (<10 degrees). Three patients had knee joint stiffness but they had loss of only terminal 20 degrees. 10% (n=6) had shortening of less than 1 cm. In one case there was implant failure (breakage of screw after one year) and reverse Z- effect.



Figure 3: Complications: 3A: broken antirotation screw, reverse-Z effect, 3B: Derotation screw was not inserted but fracture united

In our study the average duration of hospital stay was 11.67 days. 90% patients had near normal anatomical fracture reduction and mean fracture union was in 16.5 weeks. The mean time for full weight bearing was 16.3 weeks. All patients enjoyed good range of hip and knee range of motion. Post operative mobility was aided in immediate post operative period but later all patients were ambulatory independently with or without walking aid after 6 weeks. Anatomical results were assessed by presence or absence of deformities, shortening, hip and knee range of motions. In our study, one patient had varus malunion <10 degrees. In our series of 66 operated cases, 6 cases were lost for follow up. Functional and anatomical results were assessed by using Harris Hip Scoring System (Modified).[11]

Table : 2 Functional results of Peritrochanteric fractures

Functional results	Number of cases	Percentage
Excellent	36	60
Good	15	25
Fair	8	13.3
Poor	1	1.67

Excellent results were seen in 50% cases, good in 33.3% cases, fair in 16.7% in intertrochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3%, good in 21.4% cases and fair were seen in 13.3%. We had one case with poor results.

Discussions

The treatment of pertrochanteric fractures of femur is still associated with some failures. The reasons are: disregard for biomechanics, overestimation of the potentials of new surgical techniques or new implants or poor adherence to established procedures. High stress concentration that is subject to multiple deforming forces, slow healing time because of predominance of cortical bone, decreased vascularity, high incidence of complications reported after surgical treatment compels the surgeon to give a second thought regarding selection of the proper implant. The most common current modes of fixation are Blade plate systems, Sliding screw systems and Intramedullary devices has helped Use of intramedullary devices like Gamma nailing & proximal femoral nailing gained importance as discussed by Pelet S et al [12] & Adams CI et al [13] because of minimal invasion & biomechanical advantage. Gotze et al.[14] compared the loadability of osteosynthesis of unstable per and subtrochanteric fractures and found that the PFN could bear the highest loads of all devices. In our study the mean age was 52.3 years with significant female male ratio of 3:1. As against 63.7 years seen in series of Reska et al.[15] and in study of Korkmaz et al[16] it was 77.66 years. RTA was most common mechanism of injury followed by falls especially in elderly population as suggested by Sudan et al [17].

The average blood loss was 100 ml and the mean operative time was 75 minutes which is comparable to the series of M. Tyllianakis et al.(average blood loss of 150 ml and mean operative time of 68 minutes).[18] The mean operation time was 37.8 min (range 22 to 118 min) and the mean blood loss was 225 ml in a series of 45 intertrochanteric fractures of Sahin S et al.[19] In our series of 60 patients, union was achieved in all, but one ,patients, 5 patients(8.35%) had delayed union while Boldin et al [20]series of 55 patients had 88% union, 3% non union and 3% delayed union.

A cut out of the neck screw occurred in 0.6% cases in the study conducted by Simmermacher et al [9] as against 1.67% in our study . In their series anatomical fracture reduction was found in 86% of the patients and full weight bearing stability was achieved in 94%. In our study acceptable anatomical reduction was obtained in 90.0% cases but we did open reduction for two fractures, as against Korkmaz et al series in which postoperative radiographs showed a near-anatomical fracture reduction in 78% of patients.

In Gadegone & Salphale series[21] of 100 cases of proximal femoral fractures fixed with PFN, a near-anatomical fracture reduction was seen in 88% of patients, fracture union was seen in 4.5 months, no perceptible shortening was noted, 7% had superficial infections which were controlled with antibiotics, 82% had a full range of hip motion. In our study we had 90% near normal anatomical fracture reduction and fracture consolidated in 16.5 weeks. 88.6% had full range of hip motion and 11.4% had terminal restriction of rotation movements. We encountered one nonunion. One case of implant failure (breakage of screw) was observed.

Metin Uzun et al, [22] in a study of 35 patients, achieved good or acceptable reduction in all the patients. Complete union was seen in all but two patients had non union . 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 87.1.Radiological complication chiefly include 1 case of varus malunion. We had one implant failure (breakage of derotation screw) and one reverse Z –effect.

In a series of 90 patients of unstable intertrochanteric femoral fractures treated with PFNA, Ye PH et al [23]showed mean Harris hip score of (80.5 +/- 9.8). According to Harris hip scores evaluation system, 26 patients reached an excellent result, 37 good, 18 poor and 9 bad. In our series mean Harris hip score was 87.1. Excellent results were seen in 50% cases, good in 33.3% cases, fair in 16.7% in intertrochanteric fractures. While in a series of 45 patients of Sahin et al, [19] mean Harris hip score was 77.8, Harris hip scores were very good in 11 patients (24.4%), good in 19 patients (42.2%), moderate in nine patients (20%), and poor in six patients (13.3%). 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 fracture healing, decrease blood loss, infection, minimizes soft tissue dissection and wound complications.

CONCLUSION

The main objective of the management of elderly patients with peritrochanteric fractures is a successful return to safe mobility. In our experience use of PFN in the treatment of peritrochantric fractures produces better results. Good anatomical reduction with posteromedial cortical contact & placement of screws as discussed will prevent complications.

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