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Prospective study of Intertrochanteric femur fractures managed with proximal femoral nailing

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Abstract

Background: Elderly patients with a minor fall can sustain a fracture in this area because of debilitated bone due to osteoporosis or pathological fracture and this account for 90%. Benefits of intramedullary devices like PFN include preserved blood supply to the bone fragments, less operative blood loss and less disruption of the environment. The study was conducted to determine the union rate, functional outcome and the complication in intertrochanteric fractures treated by PFN.

Materials and Methods: A prospective observational study on 30 patients with intertrochanteric fractures were done at a tertiary care centre between April 2018 to March 2019. All patients were managed by proximal femoral nail. The patients were evaluated radiologically and functionally. The radiographic evaluation was done for a minimum of three cortices union on anteroposterior and lateral views. The functional evaluation was done on the basis of Harris Hip Score (HHS).

Results: The results of the treatment of stable intertrochanteric fractures using Proximal Femoral Nail were assessed by Harris Hip Score system. Most of the patients were having fair to excellent outcome.

Conclusion: we consider that the PFN is a highly accepted minimally invasive implant for unstable proximal femoral fractures but future modification of the implant to avoid Z-effect phenomenon, careful surgical technique and selection of the patients should further reduce its complication rate. Early post-operative ambulation and physiotherapy improves the results of PFN.

Keywords: Intertrochanteric fractures, proximal femoral nail, Harris hip score, osteoporosis

Introduction

The incidence of intertrochanteric fractures has been increasing significantly due to the rising age of modern human populations^[1]. Elderly patients with a minor fall can sustain a fracture in this area because of debilitated bone due to osteoporosis or pathological fracture and this account for 90%^[2]. The occurrence of proximal femoral fractures among females is 2 to 3 times higher than the incidence of such fractures amongst males^[3]. Also, the possibility of sustaining a proximal femoral fracture doubles every 10 years subsequent to age 50 years. Added risk factors for proximal femoral fractures include osteoporosis, a maternal history of hip fractures, disproportionate alcohol consumption, high caffeine intake, physical inactivity, low body weight, prior hip fracture, the use of certain psychotropic medications, visual impairment, dementia, residence in an institution, and smoking^[4].

In view of the fact that the femur is the longest and the strongest bone in the body and the principal load bearing bone in the lower extremity, fracture of this bone may result in drawn out morbidity and far-reaching disability unless the treatment is apt. Conservative management of intertrochanteric femoral fracture often yields poor therapeutic outcomes, and surgical fixation is generally warranted^[6]. Conservative treatment are coupled with problems of prolonged recumbence like decubitus ulcer, UTI, pneumonia, joint contractures and thromboembolic complications ensuing in a high mortality rate^[7]. The various operative modalities available are 95 degree lag screw, angled blade plate, Intramedullary Hip Screw (IMHS), gamma nail, Russel -Taylor reconstruction nail, Trochanter Fixation Nail(TFN) and Proximal Femoral Nail(PFN)^[8]. Benefits of intramedullary devices like PFN include preserved blood supply to the bone fragments, less operative blood loss and less disruption of the environment^[9].

After fracture fixation, the patient usually requires protected weight bearing for 6 to 12 weeks, and as callus formation is observed radiographically, weight bearing is slowly increased.

This study consists of 30 cases of intertrochanteric fractures which were fixed with proximal femoral nail and their final outcome is compared. The study was conducted to determine the union rate, functional outcome and the complication in intertrochanteric fractures treated by PFN.

Materials and Methods

A prospective observational study on 30 patients with intertrochanteric fractures were done at a tertiary care centre between April 2018 to March 2019. All stable intertrochanteric fractures were included in the study. The patients having pathological fractures, compound fractures and unstable intertrochanteric fractures were excluded from the study. The patients who denied to participate in the study were also excluded. All patients with stable intertrochanteric fractures were managed by closed reduction and internal fixation with PFN. The patients were immobilized for a day and then partial weight bearing mobilization till radiological signs of union. The patients were followed up regularly every month till union and then at 6 months. The patients were evaluated radiologically and functionally. The radiographic evaluation was done for a minimum of three cortices union on anteroposterior and lateral views. The functional evaluation was done on the basis of Harris Hip Score (HHS). The data was compiled and analysed for statistical significance. The level of significance, p value was kept at <0.01.

Results

In our study, the maximum age was 85 years and minimum age was 24 years.

Table 1: Age Distribution of the patients

Age group	No. Of cases	Percentage
21- 30 years	2	6%
31- 40 years	2	6%
41-50 years	2	6%
51- 60 years	8	27%
Above 61 years	16	53%

Table 1 shows age wise distribution of the patients in our study. In our study, there were 73% males and 27% females.

Table 2: Gender Distribution of the patients

Sex	No. of cases	Percentage
Males	22	73%
Females	8	27%

Table 2 shows gender wise distribution of the patients in our study.

The most common mode of injury in our study was self-fall followed by Road Traffic Accidents (RTA).

Table 3: Nature of Violence

Nature of Violence	No. of cases	Percentage
RTA	10	33%
Self-Fall	16	53%
Fall from Height	3	10%
Others	1	3%

Table 3 shows mode of injury in our study.

Few cases had intraoperative complications, most common being jamming of instruments.

Table 4: Intraoperative Complications

Complication	Number of cases	Percentage
Fracture of lateral cortex	0	-
Fracture displacement by nail insertion	0	-
Failure to get anatomical reduction	0	-
Jamming of Instruments	2	7%
Failure to put derotation screw	1	3%
Failure of distal locking	1	3%
Breakage of guide wire	2	7%
Breakage of drill bit	0	-
Varus angulation	1	3%

Table 4 shows various intraoperative complications in our study. The results of the treatment of stable intertrochanteric fractures using Proximal Femoral Nail were assessed by Harris Hip Score system.

Table 5: Results of the treatment assessed using Harris Hip Score system.

Harris Hip Score	No. of cases	Percentage
Poor (0 - 69)	4	13%
Fair (70 - 79)	10	33%
Good (80 - 89)	14	47%
Excellent (90 - 100)	2	7%

Table 5 shows functional outcome using Harris Hip Score

Discussion

Fractures of the proximal femur are challenging injuries for the orthopaedic surgeon. The subtrochanteric and intertrochanteric fractures of the proximal femur management are related with some failures^[10]. Faulty operative procedures, unsatisfactory reductions, serious osteoporosis, and incorrect positioning of the weight bearing screw are the most important factors responsible for the failed internal fixation^[11]. High stress concentration which is subject to multiple deforming forces, and long healing duration because of predominance of cortical bone, decreased vascularity, result in high incidence of complications after surgical management^[12]. Closed management of these injuries poses difficulty in obtaining and maintaining a reduction, making operative treatment the ideal treatment.

An intramedullary device inserted by means of minimally invasive procedure is suitable in elderly patients. Closed reduction maintains the fracture hematoma, which is vital for the consolidation^[13]. Intramedullary fixation is helpful to minimize soft tissue dissection and reducing surgical trauma, blood loss, infection, and wound complications. The durability of the implant bone construct would be stronger in younger patients with stronger bone^[14]. A precise reduction and proper surgical method are of utmost importance in the treatment of intertrochanteric fractures with the PFN. PFN is a novel, recent intramedullary implant based on experience with the gamma nail^[15]. The benefits of Proximal femoral nail are, it can be introduced by closed technique, which preserves the fracture hematoma which is important in fracture healing, decreased blood loss, decreases infection, minimizes soft tissue dissection and wound complications^[16]. Windolf *et al.*^[17] reported identified intraoperative technical difficulties in 23 patients (19.1%). Seven cases showed postoperative local complications that required operative revision on six patients (4.9%). The main reasons for the failure of the operations involved were poor

reduction and wrong choice of screws. In our series we did encounter drawbacks as poor reduction in 1 case, and cut out of screws in 1 case. An intra-operative fracture dislodgment during manual introduction of the nail into the femoral shaft has been a problem with the PFN^[18]. The rationale 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 lead to an intraoperative fracture dislodgment^[19]. In our study we did not face any intraoperative fracture dislodgment after nail insertion. In comparison to gamma nail, we did not face neither any fracture of the femoral shaft or any break in the implant, intraoperatively. The aims and objectives of this series is to study unstable intertrochanteric fractures of femur in adults and its biomechanics, to study the results of surgical management of these fractures with Proximal femoral nailing, to re-establish the anatomy of these fractures flawlessly by operative management using proximal femoral nailing, to assess the union of these fractures after surgical management using Proximal femoral nailing, to assess the stable fixation and early ambulation of the patients and to assess the post-operative restoration of the walking capacity of these patients.

The criteria for the evaluation of efficiency of surgical technique included interval of surgery, number of intraoperative complications, blood loss and radiographic screening time. Clinical evaluation includes post-operative walking capacity, hip and knee function, fracture union time, and implant bone interaction by Harris Hip Score^[20]. In the study carried out by Papisimos *et al.*^[21] the average operating time was 71.2 minutes and open reduction was needed in 8.1% with mean blood loss of 220 ml. seven cases showed local intraoperative complications (3.3%). In our study, no deaths were reported during the study period.

In the series conducted by Papisimos S, Koutsojannis CM, Panagopoulos A, Megas P, Lambiris E and others, 40 patients of proximal femoral fractures were treated by PFN. In the series conducted by Boldin C, Seibert FJ, Fankhauser F and others, 34 patients of unstable proximal femoral fractures were managed by PFN. The comparison of this series with the present series is as follows.

Table 6: In the series conducted by Papisimos S, Koutsojannis CM, Panagopoulos A, Megas P, Lambiris E and others, 40 patients of proximal femoral fractures were treated by PFN

Sl. No.	Series	No. of patient	Union	Non union	Delayed union
1	Papisimos's	40	100%	0%	5%
2	Boldin's	55	88%	5.4%	5.4%
3	Present study	30	86.6%	7%	7%

According to Hip Harris Score (Modified), overall 7% of patients had outstanding results, 47% of patients had good results, 33% of patients had fair results and only 4 cases i.e., 13% of patients had poor results. After comparing in various studies, it was seen that our series was comparable with most of the standard published series.

The study has few limitations. The sample size is small and the follow up time of 6 months is small to comment on long term complications.

Conclusion

In the light of the results obtained from the present study, we believe that the PFN emerges as a valid option for the treatment of unstable proximal femoral fractures of the trochanteric region, because of the simplicity and lack of aggressiveness of the surgical technique and the low level of technical complications

encountered, which is particularly important bearing in mind that the large majority of patients who suffer these kinds of fracture are elderly, and their general condition is frequently compromised. It offers greater stabilization than other presently used methods of internal fixation. At present, we consider that the PFN is a highly accepted minimally invasive implant for unstable proximal femoral fractures but future modification of the implant to avoid Z-effect phenomenon, careful surgical technique and selection of the patients should further reduce its complication rate. Early post-operative ambulation and physiotherapy improves the results of PFN.

References

- Hwang LC, Lo WH, Chen WM, *et al.* Intertrochanteric fractures in adults younger than 40 years of age, Archives of Orthopaedic and Trauma Surgery. 2001;121(3):123-126.
- Cummings SR, Nevitt MC. A hypothesis: The causes of hip fractures, Journal of Gerontology. 1989;44(4):M107-111.
- Hopkinson-Woolley JA, Parker MJ. Fractures of the hip Does the type of fall really affect the site of fracture? Injury. 1998;29(8):585-587.
- Horowitz BG. Retrospective analysis of hip fracture, Journal of Gynecology and Obstetrics Surgery. 1996;123:565.
- Tencer AF, Johnson KD. Biomechanics in orthopedic trauma: Bone fracture and fixation, Current Orthopaedics. 1996;10(3):208.
- Pare A. The work of the famous Chirurgian, Ambrosie Pare. 1634;15:116.
- Bauer GC, Sir Astley Cooper. Prototype of the modern day academic Orthopedist, Clinical Orthopaedics and Related Research. 1987 Dec;225:247-54.
- Von Langenback B, Verhandl D, Deutsch P Gesellsch. Description of transfixation of femoral fractures, Journal of Bone and Joint Surgery. 1865;20:300-305.
- Smith-Peterson MN, Cave EF, Van Gorden GW. Intracapsular fractures of femur, Archives of Orthopaedic and Trauma Surgery. 1931;23:715-759.
- Westcott H. Preliminary report of a method of internal fixation of transcervical fractures of the neck of femur in the aged, VAME Monthly Journal. 1932;59:197.
- Henderson M. Surgical technique for hip fracture fixation, Mayo Clinic Proceedings. 1934;9:203.
- Henry M. Lateral introduction of the screw bolt in intracapsular fracture of the hip, Journal of Bone and Joint Surgery American. 1938;20(2):400-404.
- Thornton L. The treatment of trochanteric fractures of femur: Two new methods, Piedmont hospital Bull. 1937;10:21-35.
- Godoy-Moreira F. A special stud bolt screw for fixation of fractures of the neck of femur, Journal of Bone and Joint Surgery American. 1940;22(3):683-697.
- Jewett EL. One-piece angle nail plate for trochanteric fractures, Journal of Bone and Joint Surgery. 1941 Oct;23:803-810.
- Boyd. Classification and treatment of trochanteric fractures, Archives of Orthopaedic and Trauma Surgery. 1949;58:853-863.
- Evans. The treatment of trochanteric fractures of femur, Journal of Bone and Joint Surgery. 1949;31B:190.
- Eggers G, Pomerat CM. The influence of the contact compression factor on osteogenesis in surgical fractures, Journal of Bone and Joint Surgery American. 1949;31(4):694-716.

19. Taylor NM, Jansen J. Internal fixation for intertrochanteric fractures, *Journal of Bone and Joint Surgery American*. 1954;26(4):707-712.
20. Pugh WL. A self-adjusting nail-plate for fractures about the hip joint, *Journal of Bone and Joint Surgery American* 1955;37(5):1085-1093.
21. Clawson D. Intertrochanteric fractures of the hip, *Journal of Bone and Joint Surgery American*. 1957;93(4):580-587.