International Journal of Sciences & Applied Research

www.ijsar.in

Proximal femoral nailing improves functional and radiological outcomes of subtrochanteric fractures of femur - our experience

P. Krishna Reddy*, G. Pradeep

Department Of Orthopedics, Narayana Medical College and Hospital, ChintharedyPalem, Nellore-524002, India.
Correspondence Address: * Dr. P. Krishna Reddy, Department Of Orthopedics, Narayana Medical College and Hospital, ChintharedyPalem, Nellore-524002, India.

Abstract

Backgroud: Fractures around the trochanteric region of femur are one of the commonest fractures encountered in orthopedics among all the ages including elderly. Subtrochanteric fracture of the femur is a variant of peritrochanteric fracture of the femur. Subtrochanteric fracture is one of the most difficult fractures to treat and treatment failure is common. In this study we have evaluated the functional outcome of subtrochanteric femur fractures treated with proximal femoral nail based on clinical and radiological criteria.

Methods: A total of 25 cases of subtrochanteric fracture of the femur which were admitted in Tertiary care hospital, Coastal Andhra Pradesh from June 2009 to October 2011 were selected in our study. Proximal femoral nail (PFN) was used for fracture fixation and the Merle d'Aubigne scoring system score for clinical assessment and evidence of callus and consolidation as radiological criteria.

Results: Out of 25 cases, 18 were males and 7 were females. Three locking plates, 4 DHS and 4 PFN were done. Right side fractures were 52 and left side was 48. 78% were due to RTA and 12% were due to fall. PFN size used was for 23 patients 9 mm and for 3 patients 10 mm. All the fractures united with good to fair results, with few complications like mild restriction of the hip range of motion and limb discrepancy.

Conclusion: With the various choices of implants for the fixation of subtrochanteric fracture of the femur the PFN is a good implant for subtrochanteric fracture of the femur. The advantages include minimal exposure (close technique), better stability and early mobilization. Fractures united in all cases and postoperative functional outcome was satisfactory. PFN could be a preferred implant of choice in treating subtrochanteric fractures especially in elderly since it allows early and stable mobilization.

Keywords: Subtrochanteric femur fracture, proximal femoral nail, system, Fracture fixation, Merle d'Aubigne scoring

Introduction

Fractures around the trochanteric region of femur are one of the commonest fractures encountered in orthopedics 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] Subtrochanteric fracture of the femur is a variant of peritrochanteric fracture of the femur [2]. It lies in the area which is 5cm below the lesser trochanter. It may extend proximally into the intertrochanteric area and distally upto the isthmus of the shaft of the femur [3, 4]. Its incidence is much lower than that of the intra and extra capsular fracture of the neck of the femur. The incidence usually is six per 1 lack population per year, with a female preponderance [5]. It is common in older patients after low energy trauma along with osteoporosis and in younger patients with high energy trauma [6]. The mechanism of the injury is fall and direct lateral hip trauma, road traffics accidents, axial loading, fall form height and gunshot injury [7].

Surgery is the mainstay of treatment. The goal of treatment is fracture reduction so that near anatomic alignment and normal femoral anteversion are obtained. [8] 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.[9] Subtrochanteric fracture is one of the most difficult fractures to treat and treatment failure is common for it, due to the complications of mal-union, non-union, shortening, angular deformity and rotational malunion [10-11]. 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 [12] 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). [13] The indications for use of the proximal femoral nail (PFN) included were intergrochanteric fractures, reversed fractures, pathologic fractures and combined trochanteric femur shaft fractures. In this study we have evaluated the functional outcome of subtrochanteric femur fractures treated with proximal femoral nail based on clinical and radiological criteria.

Methodology

The study was done 2 years and 3 months during the period of June 2009 to October 2011.the total number of patients were 25. Patients who were admitted in department of orthopedics, Narayana Medical College & Hospital with proximal femoral fractures that fitted into the inclusion criteria and were treated surgically with proximal femoral nail were included in the study including the follow-up.

Intramedullary fixation of Subtrochanteric fractures with the Proximal Femoral Nail (PFN) – is a reliable implant, leading to good union and less soft tissue damage. It has a biomechanical advantage, but it is a technically demanding operation. Long PFN fixation, irrespective of the degree of proximal comminution, is preferable and the cephalomedullary nail with a greater lateral offset, allows the entry portal more laterally, irrespective of the involvement of the piriformis fossa. It is also clear that the overall results of IM nailing are better than those of plate fixation, according to Parker et al (1997) [3].

Inclusion criteria are acute subtrochanteric femur fractures in patients aged from 18 years onwards, pathological subtrochanteric femur fractures. An exclusion criterion was open fractures, cases infected in the preoperative period and fractures in patients below the age of 18 years. Radiograph of pelvis with both hips AP view and affected hip Lateral view were 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. The Merle d'Aubigne scoring system [14] score is used for clinical assessment and evidence of callus and consolidation are used as radiological criteria. The Merle d'Aubigne scoring system used in this work depends on

Table1: Functional and radiological outcome of Subtrochanteric fractures of femur by Proximal Femoral Nail		
Parameters	**N**	**%**
Gender		
Male	18	72
Female	7	28
Age		
18-30	8	32
31-50	7	28
51-70	9	36
>70	1	4
Laterality of fractures		
Right	13	52
Left	12	48
Mode of Injury		
RTA	19	76
Fall	6	24
Seinsheimer classification of fractures		
Type - 1	0	0
Type -2A	4	16
Type -2B	5	20
Type - 2C	6	24
Type - 3A	5	20
Type - 3B	4	16
Type - 4	1	4
Type - 5	0	0
Size of PFN		
9 mm	23	92
10 mm	2	8
Duration of surgery (Minutes)		
0-60	1	4
60-120	20	80
>120	4	16
Complications		
Infection	1	1
Limb length discrepancy	4	16
Length of hospital stay	17.9±2.3 days	
Time to radiological union	4.6±0.8 months	
Merle d'Aubigne scoring system Functional Outcome		
Excellent	2	8
Good	18	72
Fair	4	16
Poor	1	4

three 'core' factors: pain, mobility, and walking. Each factor is rated from 0 to 6 and the total score represents the summation of the points of three factors (18 points). Excellent: in this scoring system it is denoted by highest score of 18, Good: ≥15 points, Fair: 12–14 points and Poor: ≤11 points. These cases were 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.

Statistical analysis

Data was entered into excel spread sheet -7 and statistical analysis was performed using SPSS-16. Descriptive data was presented as mean ± Sd and categorical data as actual numbers and percentages.

Results

Out of 25 cases, 18 were males and 7 were females. Three locking plates, 4 DHS and 4 PFN were done. Right side fractures were 52 and left side was 48. 78% were due to RTA and 12% were due to fall. PFN size used was for 23 patients 9 mm and for 3 patients 10 mm.All the fractures united with good to fair results, with few complications like mild restriction of the hip range -of motion and limb discrepancy. Merle d'Aubigne scoring system Functional Outcome good – 18, fair – 4, excellent -2 and poor -1.

Discussion

In our work we encountered no femoral shaft fracture during nail insertion. Yoo and colleagues reported one case of femoral shaft fracture at the nail tip caused by a slip. Boriani et al reported having no intraoperative shaft fractures in 119 consecutive nailing [15-16].

Christian boldin et al proximal femoral fractures healed in all 55 patients. The longest consolidation time was 5 months which was one month less than the longest time seen in our series. (17) Rosenblum et al

(1992) and Prinzby et al (1996) found that the mechanical point of view a combined intramedullary device inserted by means of a minimally invasive procedure seems to be better in elderly patients. [18-19]

Duration of hospital stay was comparable. Mean operation time in our study was 60-120 minutes on an average. We did not come across any implant related complications compared to the 11% seen by in the study Menezes et al [20]. As compared to extramedullary implants the duration of the stay in hospital by Parker et al [21] which was 35 days, the average duration of stay in our series was 17 days.

Distal locking screws are indicated in subtrochanteric fractures but they have been recognized as the origin of complications, specifically diaphyseal fractures. Two distal locking screws were used in all fractures, and there was no postoperative femoral shaft fracture

in any case. Alvarez et al. [22] mentioned that, as the distal part of the nail already produces a concentration of stress at that site, weakening of the bone by screws should be avoided.

Conclusion

The PFN is a good implant for subtrochanteric fracture of the femur. The advantages include minimal exposure (close technique), better stability and early mobilization. Fractures united in all cases and postoperative functional outcome was satisfactory. PFN could be a preferred implant of choice in treating subtrochanteric fractures especially in elderly since it allows early and stable mobilization. A larger study may be desirable.

Conflict of interest

None

References

1. LaVelle DG, Canale ST and Beaty JH, Campbell's Operative Orthopaedics. Vol 3,11th ed. Philadelphia: Mosby; 2008. p. 3237-8, 62. (vol3).
2. Canale ST, Beaty JH, Fractures and Dislocations of the Hip. In: Lavelle DG Editor. *Campbell's operative orthopaedics*. 11th ed. Mosby Elsevier: 2007; 3262-70.
3. Clifford R. Subtrochanteric Fracture. *Wheeless Text Book of Orthopaedics*. [last updated: 30/06/2011.Available : http://www.wheelessonline.com/ortho/Subtrochanteric_fractures
4. Jiang LS, Shen L, Dai LY. Intramedullary fixation of Subtrochanteric fractures with a long proximal femoral nail or a gamma nail: Technical notes and preliminary results. *Ann Acad Med Singapore*. 2007; 36:821-26. (3)
5. Court-Brown C M, Alho A, Robinson CM. Subtrochanteric fracture. In: Court-Brown CM Editor. *Musculoskeletal Trauma Series Femur*, Arnold, 2002; 88-95.
6. Bucholz RW, Heckman JD, Court-Brown, Charles M. Subtrochanteric Fractures. In Leung KS Editor. *Rockwood and Green's Fractures in Adults*. 6th ed. Lippincott Williams and Wilkins; 2006;1828-44.
7. Rijal KP, Manandhar RR, Pandey BK. *Subtrochanteric fractures of the femur: Result of ORIF at KMCTH*. Kathmandu University Medical Journal. 2007; 5(18):161-65.
8. Rockwood CR, Green DP, Bucholz RW, Heckman JD. Rockwood and Green's Fractures in Adults, Vol-2, 4th ed. Philadelphia: Lippincott-Raven Publishers; 2010. p. 1741- 44
9. Browner BD, Levine AM, Jupiter JB, Trafton PG. Skeletal trauma, Basic science, Management, and Reconstruction. 3rd ed. Philadelphia: Saunders; 2003.

10. Waddell JP. Subtrochanteric fracture of the femur: a review of 130 patients. *J Trauma* 1979; 19: 582-92.
11. Mullaji AB, Thomas TL. Low energy Subtrochanteric fracture in an elderly patient: result of fixation with a sliding screw plate. *J Trauma* 1993; 34: 56-61.
12. Pelet S: Arlcttaz Y, Chevalley F. "Osteosynthesis of pertrochanteric and subtrochanteric fractures with 90° blade plate versus Gamma nail-A randomized prospective study". SWISS-SURG 2001; 7 (3): 126-33.
13. Kuppa Srinivas et al A Study on Surgical Management of Intertrochanteric and Subtrochanteric Fractures of Femur by Proximal Femoral Nail". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 3, January 19, 2015; Page: 228-235.s
14. D'Aubigne RMPostelM. Functional results of hip arthroplasty with acrylic prosthesis. J Bone Joint Surg Am 1954; 35:451–475.
15. Yoo JH, Yang KH, Park SY, Won JH, Yoon HK. The treatment of unstable reverse oblique intertrochanteric fractures with proximal femoral nail (PFN). J Korea Orthop Assoc 2005; 40:733–740.
16. Boriani S, De Iure F, Bettelli G, Specchia I, Bungaro P, Montanari G, et al.The results of a multicenter Italian study on the use of the Gamma nail for the treatment of pertrochanteric and subtrochanteric fractures: a review of 1181 cases. Chir Organi Mov 1994; 79:193–203.
17. Christian boldin, franz j siebert , florian fankhauser, "The Proximal Femoral Nail- a minimal invasive treatment of unstable proximal femoral fractures". Acta Orthop Scand 2003; 74[1]; 53-58
18. Rosenblum, S.F., Zuckerman, J.D., Kummer, F.J., et al., 1992. A biomechanical evaluation of the Gamma nail. Journal of Bone and Joint Surgery-British 74, 352–357
19. Prinz S, Letsch R, Büscher D. Gamma-nagel und Classic-nagel (Intramedulläre Stabilisierung) versus DHS (Extramedulläre Stabilisierung) bei proximalen Femurfrakturen.Hefte Unfallchir 1996; 262: 14
20. Menezes DF, Gamulin A, Noesberger B. Is the proximal femoral nail a suitable implant for treatment of all trochanteric fractures? Clin Orthop Relat Res 2005; 439:221-227.
21. M. J. Parker and H. H. Handoll, "Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults," Cochrane Database of Systematic Reviews, vol. 16, no. 3, Article ID CD000093, 2010.
22. Alvarez JR, Gonzolez RC, Aranda RL, et al. Indications for use of the long Gamma Nail. Clin Orthop 1998; 350:62–66.