

Original Research Article

A comparative study of functional outcome of short proximal femoral nail with long proximal femoral nail in proximal femoral fractures

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ABSTRACT

Background: Trochanteric femoral fractures are often seen in patients aged they can be caused by high-energy or low-energy trauma or may be pathological. Particularly in the elderly, hip fractures are a major cause of increased mortality and morbidity. Because of the decreased physical capacity, concomitant systemic diseases, and increased vulnerability to environmental dangers, even low-energy trauma can cause unstable femoral trochanteric fractures in this age group. Compare the functional outcome of the short proximal femoral nail with a long proximal femoral nail in proximal femoral fractures.

Methods: This retrospective study was conducted in the Department of Orthopaedics, Karpaga Vinayaga Institute of Medical Sciences and Research Centre, Chengalpattu Dist., Tamil Nadu, India. (KIMS & RC). Palmer/Parker score is obtained for the functional outcome of the short proximal femoral nail with a long proximal femoral nail in proximal femoral fractures.

Results: It is concluded from our study that proximal femoral nailing is an attractive and suitable implant for Proximal Femoral Fractures and its use in unstable intertrochanteric fractures is very encouraging.

Conclusions: The database of our retrospective study regarding age & sex incidence, clinicopathological features and therapeutic outcome was comparable to other studies in various literatures.

Keywords: Proximal femoral nail, Short femoral nail, Long femoral nail

INTRODUCTION

Intertrochanteric fracture is one of the most devastating injuries in the elderly. The incidence of these fractures increases with advancing age. These patients are more limited to home ambulation and are dependent on basic and instrumental activities of daily living. 50% of fractures around hip patients in the elderly is of trochanteric fracture and this 50% of fractures are an unstable type of trochanteric fractures.¹ The sliding hip screw device has been used for more than a decade for the treatment of these fractures. Though Zickel introduced his nail long ago, it was not a very popular fixation device due to a higher

incidence of complications. So was the case with Enders nail. Side plate devices when used for unstable trochanteric fracture which is commonly associated with lateral wall communication results in the excessive collapse of the proximal fragment and gross medicalization of distal fragment resulting in implant failure and delayed union or nonunion at fracture site.² Intramedullary position of the proximal femoral nail (PFN) prevents the excessive collapse of proximal fragment & medicalization of distal fragment. Being an intramedullary load-sharing device, PFN helps in early postoperative mobilization, weight-bearing, and ultimately the early fracture union. Being done as a closed

nailing procedure PFN preserve the fracture hematoma and associated with less blood loss and short operating time.³

Objective of the study was to Compare the functional outcome of the short proximal femoral nail with a long proximal femoral nail in proximal femoral fractures.

METHODS

This retrospective study was conducted in the Department of Orthopedics, Karpaga Vinayaga Institute of Medical Sciences and Research Centre, Chengalpattu Dist. Tamil Nadu, India. (KIMS & RC) in the year April 2016 to April 2019 with 30 patients. Palmer/Parker score is obtained for the functional outcome of the short proximal femoral nail with a long proximal femoral nail in proximal femoral fractures. Inclusion Criteria: Patients above 18 years of age. All proximal femoral fractures associated with or without ipsilateral shaft of femur fracture treated with short or long PFN. Exclusion Criteria: Patients less than 18 years of age. The isolated intracapsular neck of femur fractures. Pathological fractures. Patients are not willing to participate. Compound injuries. Patients are medically unfit for surgery. Malunion and non-union of the proximal femur. Any other long bone fracture other than those in the inclusion criteria. Palmer/Parker score is obtained as follows: Three points if the patient was able to ambulate outside and go shopping without any difficulty. Two points if the patient needed an aid. One point if the patient needed the help of another person. Zero points if mobility was impossible.

Functional outcome at 12th postoperative day, 6th week, 3rd month and 6th month will be evaluated.

Statistical analysis

Software SPSS software 20v (statistical package for scientific studies). Statistical analysis-Mean, median, SD calculated for descriptive analysis. Chi-square test can be used to compare data @5% level of significance.

RESULTS

In Table 1 shows 118 (60%) of the study participants were more than or equal to 60 years of age. About 18 (60%) were females. The left intertrochanteric fracture was present in 13 (43.4%) of the participants followed by 10 (33.3%) with a right intertrochanteric fracture. 30% were classified as 31 A2 2. The mode of injury was self-fall by 60% while RTA in 40%. Left collies fracture and left inferior pubic ramus fracture were found to be the associated fractures. In about 12 (40%) nail length was 180 and in 14 (46.7%) nail length was 380. In 14 (46.7%) the neck-shaft angle was 120-140 and it is more than 140 in 10 (33.3%) of the participants.

In Table 2 shows the mean operating time was found to be 77.76±16.10 mins. The mean blood loss was 181.67±81.46

ml. The mean union time was 21.23±2.06 weeks. Four (13.3%) had complications, namely, screw pull out and superficial infection. 86.7% had a mobility score of 3 and remaining had a score of 2.

Table 1: Baseline and socio demographic characteristics of the study population.

Variables	Freq (N)	%	
Age (in years)	30-39	4	13.3
	40-49	4	13.3
	50-59	4	13.3
	60-69	6	20.0
	70-79	9	30.0
	≥80	3	10.0
Sex	Male	12	40
	Female	18	60
Diagnosis	Left intertrochanteric fracture	13	43.4
	Left subtrochanteric fracture	3	10
	Right intertrochanteric fracture	10	33.3
	Right subtrochanteric fracture	4	13.3
Classification	31 A1 1	3	10
	31 A1 2	5	16.7
	31 A1 3	2	6.7
	31 A2 1	2	6.7
	31 A2 2	9	30.0
	31 A2 3	1	3.3
	31 A3 1	7	23.3
	31 A3 3	1	3.3
Mode of injury	RTA	12	40
	Self-fall	18	60
Associated fractures	Left collies fracture	1	3.3
	Left inferior pubic ramus fracture	1	3.3
	Nil	28	93.3
Nail length	180	12	40
	240	4	13.3
	380	14	46.7
Neck shaft angle	<120	6	20
	120-140	14	46.7
	>140	10	33.3
Total	30	100	

In Table 3 shows when the outcome variables like operating time, blood loss, and union time were compared to the respective nail length, it was found out that nail length was not playing role in determining operating time or blood loss. The operating time was found to be more for longer nails than shorter nails. Union time was found to be statistically lesser in longer nails than the shorter ones.

Table 2: Distribution of outcome variables among the study population.

Variable	Frequency (N)	%
Operating time (mins)*	77.76	16.10
Blood loss (ml)*	181.67	81.46
Complications	Nil	26
	Screw pull out	1
	Superficial infection	3
Union time (weeks)*	21.23	2.06
Out come	2	4
	3	26

*statistically significant.

Table 3: Association of operating time, blood loss, and union time concerning nail length.

		N	Mean	Std. deviation	F value	P value
Operating time (in minutes)	180.0	12	74.167	14.7823	0.518	0.601
	240.0	4	78.250	6.1847		
	380.0	14	80.714	19.0644		
	Total	30	77.767	16.1046		
Blood loss (in ml)	180.0	12	183.333	88.7625	0.142	0.868
	240.0	4	200.000	40.8248		
	380.0	14	175.000	87.1559		
	Total	30	181.667	81.4559		
Union time (in weeks)	180.0	12	22.250	2.0057	3.476	0.045*
	240.0	4	21.500	2.0817		
	380.0	14	20.286	1.7728		
	Total	30	21.233	2.0625		

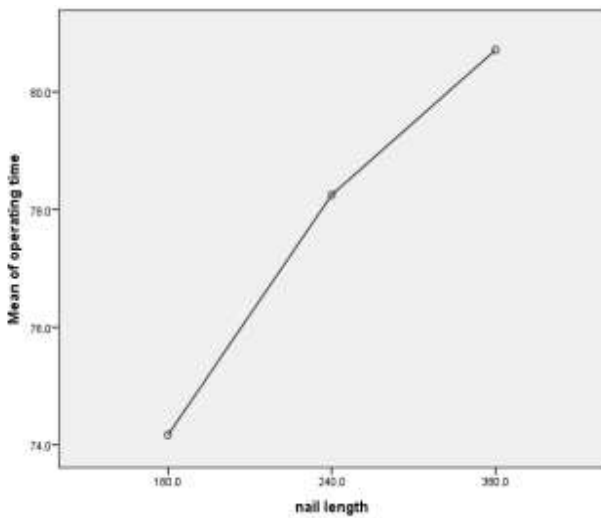


Figure 1: Comparison of nail length to mean operating time.

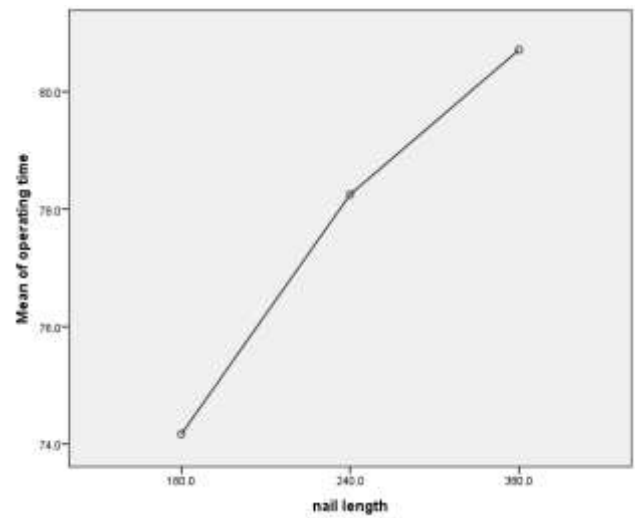


Figure 2: Comparison of nail length to mean operating time and union time.

When the outcome was associated with the nail length, 33.3% with shorter nails were found to have a mobility score of 2 while 66.7% had a score of 3. When the nail size is 240 or 380, everyone had a mobility score of 3. The above difference was found to be statistically significant with a p-value of less than 0.05 (Figure 1, 2).

DISCUSSION

The PFN is an effective intramedullary load - sharing device. It incorporates the principles and theoretical advantages of the Zickel Nail, Dynamic hip screw, and locked intramedullary nail. Biomechanically PFN is stiffer, it has shorter moment arm i.e. from the tip of the

lag screw to the center of the femoral canal whereas the DHS has a longer moment arm undergoes significant stress on weight-bearing and hence higher incidence of Lag screw cut out and varus malunion.⁴ The larger proximal diameter (15 mm) of the PFN was given additional stiffness to the nail. Minimal blood loss, shorter operative time, early weight-bearing are all advantages of PFN whereas the DHS has a longer operative time & more blood loss. In the current study, the union rate was 100% with one case of varus malunion. There were no cases of preoperative and postoperative femoral fractures.⁵ The average blood loss in patients treated with the PFN nail was 227 ml. Multiple factors have been implicated like implant design and operative technique.⁶ Decreases in implant curvature, diameter, over reaming of the femoral canal by 1.5 to 2 mm, insertion of the implant by hand and meticulous placement of the distal locking screws without creating additional stress risers decrease the complication rate of femoral shaft fracture Hopkins CT Patients with narrow femoral canal and abnormal curvature of the proximal femur are relative contra-indications to intramedullary implants.⁷ Huber SM We have followed these recommendations in our series.⁸ Hence in our series, we don't have encountered any preoperative and postoperative femoral shaft fractures. A larger cohort of patients is necessary to document the incidence of preoperative and postoperative femoral shaft fractures, which is a limitation of our study. In our series, the incidence of abductor lurch in the postoperative period was 17.5% gluteus medius tendon injury has been reported in 27% patients with the use of trochantric entry nails Lustenberger et al. The abductor lurch may improve in many numbers of patients and may remain static in some patients.⁹ Since the follow – up period of this study is short which is a limitation of our study, we could not quantify the number of patients who developed permanent damage to abductor musculature.¹⁰ In short, the PFN is a better implant with distinct advantages over the DHS. With the adequate surgical technique, the advantages of the PFN increase, and the complication rate decreases. Also, Sadowski et al found that the most common mode of injury for IT was slip and fall (70%), followed by road traffic accidents (23.3%).¹¹ Patients with slip and fall mode of injury were older whereas patients with RTA were younger. The results in the study were in agreement with an earlier study by Sarmiento et al who reported that trivial trauma (77%) was a most common mode of injury followed by road traffic accidents (23%) for the Intertrochanteric fractures.¹²

CONCLUSION

It is concluded from our study that proximal femoral nailing is an attractive and suitable implant for Proximal Femoral Fractures and its use in unstable intertrochanteric fractures is very encouraging. Intramedullary nailing with the PFN has distinct advantages over DHS like shorter operating time and lesser blood loss for unstable trochanteric fractures. Early mobilization and weight-bearing are allowed in patients treated with the incidence

of preoperative and postoperative femoral shaft fractures in PFN can be reduced by good preoperative planning and correct technique, adequate reaming of the femoral canal, insertion of the implant by hand and meticulous placement of distal locking screws.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Boyd HB, Griffin LL. Classification and treatment of trochanteric fractures. *Archi Surg.* 1949;58(6): 853-66.
2. Cheng CL, Chow SP, Pun WK, Leong JC. Long-term results and complications of cement augmentation in the treatment of unstable trochanteric fractures. *Injury.* 1989;20(3):134-8.
3. Dimon JH, Hughston JC. Unstable intertrochanteric fractures of the hip *J Bone Joint. Surg.* 1967;49(3):440-50.
4. Evans E. The treatment of trochanteric fractures of the femur. *J Bone Joint Surg.* 1949;31B:190-203.
5. Goldhagen PR, O'Connor DR, Schwarze D, Schwartz E. A prospective comparative study of the compression hip screw and the gamma nail. *J Orthopa Traum.* 1994;8(5):367-72.
6. Harrington KD. The use of methylmethacrylate as an adjunct in the internal fixation of unstable comminuted intertrochanteric fractures in osteoporotic patients. *J Bone Joint Surg.* 1975; 57A:744-50
7. Hopkins CT, Nugent JT, Dimon JH. Medical displacement osteotomy for unstable intertrochanteric fractures. *Clin Orthop.* 1989; 245:169-172.
8. Huber SM, Heining SM, Euler E. Pertrochanteric fracture fixation: photoelastic stress measurement comparing dynamic hip screw, y-nail, and proximal femur nail. *J Bone Joint Surg.* 1997;79-B (Suppl II):166.
9. Lustenberger A, Bekic J, Ganz R. Rotational instability of trochanteric femoral fractures secured with the dynamic hip screw: a radiologic analysis. *Unfallchirurg.* 1995;98:514-7.
10. Madsen JE, Naess L, Aune AK, Alho A, Ekeland A, Strømsøe K. Dynamic hip screw with trochanteric stabilizing plate in the treatment of unstable proximal femoral fractures: a comparative study with the Gamma nail and compression hip screw. *J orthopa Traum.* 1998;12(4):241-8.
11. Sadowski C, Lübbecke A, Saudan M, Riand N, Stern R, Hoffmeyer P. Treatment of reverse oblique and transverse intertrochanteric fractures with use of an intramedullary nail or a 95 screw-plate: a prospective, randomized study. *J Bone Joint Surg.* 2002;84(3):372-81.

12. Sarmiento A, Willams EM. The unstable intertrochanteric fracture: treatment with a valgus osteotomy and I-beam nail-plate. *J Bone Joint Surg.* 1970;52A-1309-18.

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