IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 21, Issue 5 Ser.3 (May. 2022), PP 50-55
www.iosrjournals.org

Comparison between short and long proximal femoral nail in unstable intertrochanteric femur fractures

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Abstract
Introduction: Hip fractures are common among the aged population. Among those hip fractures 50% are intertrochanteric fractures, of those 50-60% are categorized as unstable intertrochanteric fractures. In unstable intertrochanteric fractures early treatment is required to avoid mortality and morbidity in the patients. Treatment is immediate surgery to avoid fracture collapse and medial displacement of the fracture for which various implants have been designed. The purpose of this study was to evaluate the functional outcomes of short proximal femoral nail versus long proximal femoral nail for managing unstable intertrochanteric fractures.
Aim: To evaluate the comparison of effectiveness of short proximal femoral nail versus long proximal femoral nail for managing unstable intertrochanteric fractures.
Materials and Methods: This prospective and randomized study was done on 50 patients in the Department of Orthopaedics, Govt. Medical College Srinagar from January 2019-December 2020. The enrolled patients were evaluated from the emergency department and were distributed in two groups A and B. In group A there were 25 patients treated with long proximal femoral nail and group B with 25 patients treated with short proximal femoral nail.
Results: In this study the mean age was 56.86 years (age 30-75years). Among 50 patients 34 were female and 16 males. The post-operative complications in group B was significantly lesser than group A. The number of cases with limb shortening was more in the patients from group B as compared to group A. Short nail constructs exhibited significantly greater axial stiffness in A1 fractures and torsional stiffness in A3 fractures when compared with long nails.
Key words: *Hip fractures, unstable intertrochanteric fractures, Long proximal femoral nail, Short proximal femoral nail.*

Date of Submission: 05-05-2022 Date of Acceptance: 19-05-2022

I. Introduction

Hip fractures are common among the aged population. Among those hip fractures 50% are intertrochanteric fractures, of those 50-60% are categorized as unstable intertrochanteric fractures. Unstable Inter-trochanteric femur fractures is extracapsular fractures of the proximal femur at the level of the greater and lesser trochanter commonly caused by fall and road accidents. Unstable Intertrochanteric femur fractures are loss of the integrity of the postero-medial cortex which acts as a buttress against fracture collapse. The fracture could collapse into varus and retroversion. In elderly population a standing fall results in unstable intertrochanteric fracture, because of the frequently associated osteoporosis, they are often associated with notable morbidity and mortality [1]. Due to difficulty in obtaining anatomical reduction, management of the unstable intertrochanteric fractures in elderly patients is challenging and controversial [2, 3]. Osteoporosis and instability are the most important factors preventing early weight bearing and leading to unsatisfactory results in these cases [4, 5]. These fractures are three to four times more common in women. The low energy trauma like a simple fall is usually the cause.

In unstable intertrochanteric fractures early treatment is required to avoid mortality and morbidity in the patients. Treatment is immediate surgery to avoid fracture collapse and medial displacement of the fracture for which various implants have been designed. Extra-medullary and intramedullary implants can be used for treatment, but the role of intramedullary implants are superior [6, 7]. However, there is not any evidence to guide clinicians in their decision-making for implant choice in unstable fracture patterns [8], because in femoral shaft fractures, fixation failure and canal impingement are some common described complications associated with implants [9]. There is concern that short nails may not offer sufficient stability to the distal fracture site in these patterns, and they have been historically associated with increased incidence of subsequent periprosthetic fracture [10-14].Long intramedullary nails are thought to offer increased stability in unstable patterns [15, 16].

However, this added stability comes with a longer time under anesthesia [17, 18, 19] and higher blood loss. Short intramedullary nails insertion is thought to be easy and decrease the risk of further femoral fracture [20]. There are different studies available in literature claiming superiority of short proximal femoral nail [21,-23][10-12] individually and had shown either equal results [24][13] or better results [25][14] biomechanically in the management of unstable intertrochanteric fractures.

The purpose of this study was to evaluate the functional outcomes of short and long proximal femoral nail in the treatment of patients with unstable intertrochanteric fractures.

II. Materials And Methods

This prospective and randomized study was done on 50 patients in the Department of Orthopaedics, Govt. Medical College Srinagar from January 2019-December 2020. The enrolled patients with unstable intertrochanteric fractures were evaluated from the emergency department and were distributed in two groups A and B. In group A there were 25 patients treated with long proximal femoral nail and group B with 25 patients treated with short proximal femoral nail. Intra-operative parameters, post-operative data were noted. Fracture alignment, time of union and complications were assessed on the basis of radiographic screening. The patients were advised to follow-up in OPD after 2-weeks, 4-weeks, 12-weeks, 24-weeks and 48-weeks. The final assessment was done at 48-weeks with Harris hip score. All the enrolled patients met inclusion criteria.

INCLUSION CRITERIA

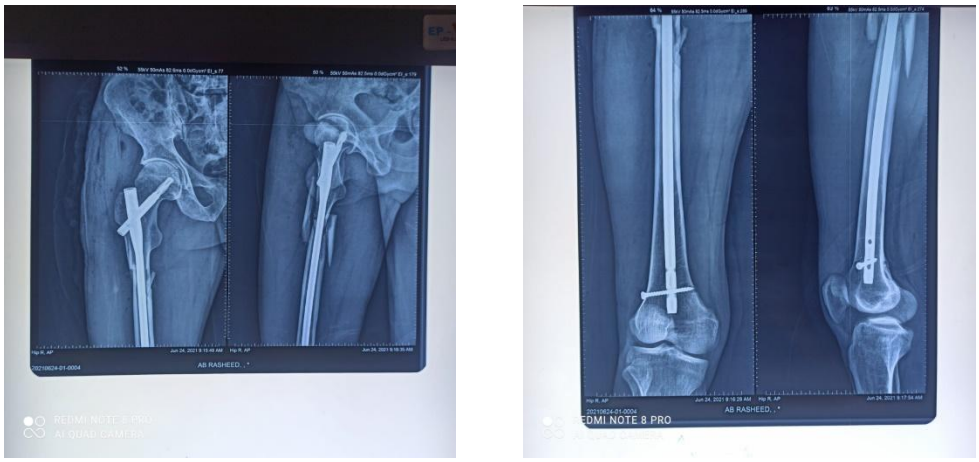
- Adult patients of both sexes.
- Age between 30-75 years.
- All traumatic unstable intertrochanteric fractures.
- Patients willing for treatment.

EXCLUSION CRITERIA

- Open fractures.
- Pathological fractures.
- Pre- existing diseases or deformities of injured hip.
- Cases with late presentation to the hospital, old neglected fractures.
- Patients unfit for surgery.
- All patients with multiple limb fractures.
- Patients with any contraindications for operative management.

After the patient with intertrochanteric fracture was admitted to hospital all the necessary clinical details were recorded and was prepared for this study. Demographic data, detailed history, clinical examination, details of investigations and interventions were recorded. Patients were randomly divided into 2 groups. Emergency management of all life threatening conditions was carried out. Routine X-Ray pelvis with bilateral hip AP and of affected thigh full length AP and lateral view was taken to know the details of the fracture. The fracture was immobilized using skin traction with weight. Clinical and radiological measurement of proper nail size was carried out.

Short proximal femoral nail



Long proximal femoral nail

SURGICAL PROCEDURE

The patients were positioned on the traction table and under fluoroscopic guidance, longitudinal traction was given and the fracture fragments were reduced. Inter operatively care was taken for the factors like duration, surgical procedure time, amount of blood loss. Patients were immediately resorted to active and passive movements in the post-operative period. Partial to full weight bearing was started as per the patients general condition and associated comorbidities permitted.

FOLLOW UP

Radiological examination was repeated post operatively and patients were advised to follow up at 6 weeks, 12 weeks, 6 months and 12months. At each follow up many aspects in patients were examined as deformity, pain, motion at fracture site and shortening. At each follow up the fractures were assessed by radiological examination, walking ability with or without support. Final assessment was done at the follow up of 12 months.

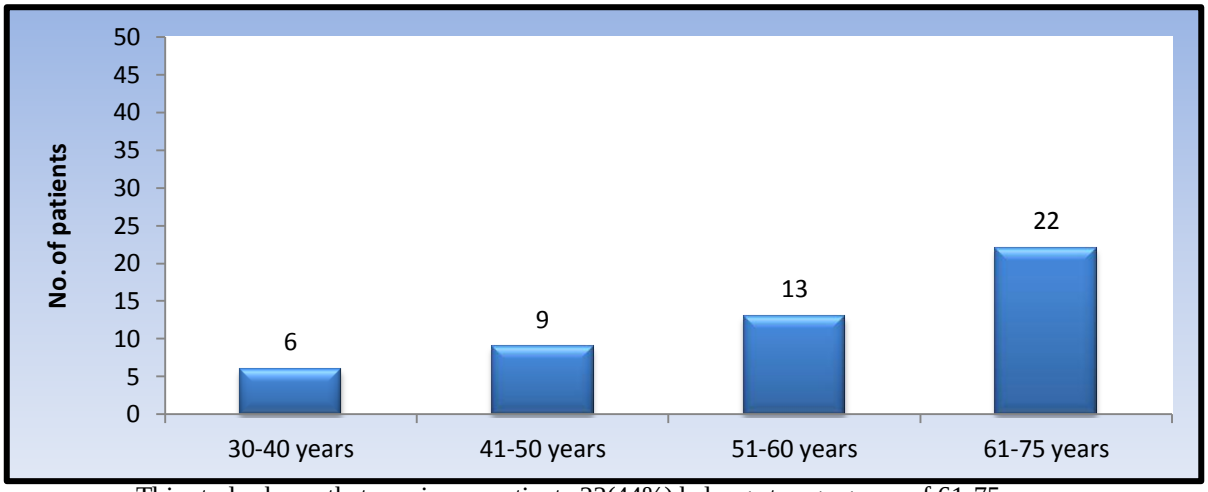
III. Results

In this study the mean age was 56.86 years (age 30-75 years). The post-operative complications in group B was significantly lesser than group A. The number of cases with limb shortening was more in the patients from group B as compared to group A. Short nail constructs exhibited significantly greater axial stiffness in A1 fractures and torsional stiffness in A3 fractures when compared with long nails.
The results obtained in his study are mentioned below.

Table 1: Distribution of patients on the basis of sex, mode of injury and side of injury

		No. of patients	Percentage
Sex	Male	16	32%
	Female	34	68%
Mode of injury	Trivial fall	37	74%
	Road accidents	13	26%
Side	Right	19	38%
	Left	31	62%

Among 50 patients 34 were female and 16 males, which implies dominance of female patients.



This study shows that maximum patients 22(44%) belongs to age group of 61-75 years.

Table 2:

	Group A	Group B
Mean operative time	61.10 minutes	52.40 minutes
Mean hospital stay	6.02 days	5.07 days
Mean union time	14.3 weeks	12.6 weeks
Harris hip score at 1 year	89.45	84.45

The mean time of union in the short PFN group was 12.6 weeks and the long PFN group was 14.3 weeks, mean hospital stay was 5.07 days in group B patients and 6.02 in group A patients and the mean union time is 12.6 weeks in group B patients and 14.3 weeks in group A patients. The Harris hip score in the short PFN group was 84.45 & the long PFN group was 87.45

Table 3:

	Group A		Group B	
	No of patients	Percentage	No of patients	Percentage
Implant failure	1	4%	1	4%
Superficial infection	2	8%	2	8%
Pain	5	20%	3	12%
Excellent	12	48%	13	52%
Good	6	24%	8	32%
Fair	6	24%	3	12%
Poor	1	4%	1	4%

In group A 1(4%) patients had implant failure, 2 (8%) patients with superficial infection, 5 (20%) patients with complaint of pain, 12 (48%) patients with excellent results and 6 (24%) good. In group B, 1 (4%) of patients had implant failure, 2 (8%) with superficial infection, 3 (12%) with pain, 13 (52%) paints shows excellent results and 8 (32%) patients were good.

IV. **Discussion**

Hip fractures are a serious cause of concern in the osteoporotic elderly population. The associated mortality and morbidity with hip fractures is significant [20]. Almost 90 % of hip fractures are sustained after having a fall [26].In our study it was found that the most common age group of patients with unstable intertrochanteric fractures was 61-75 years. In this age group the reason of fracture was simple standing fall. In younger population it is caused by high force of impact.

Our study was conducted on 50 patients with unstable intertrochanteric fracture, out of which 25 were treated with short proximal femoral nail and 25 were treated with long proximal femoral nail. In this study the number of female patients with unstable intertrochanteric fractures was more than male patients. In our study patients age group ranged from 30-75 years. In this study among 50 enrolled patients 6 (12 %) of patients were between 30-40 age group, 9(18%) of patients were between 41-50 years of age group, 13 (26 %) were between 51-60 and 22 (44%) of patients were between age group of 61-75 years. In our study number of male patients was 16 (32 %) and number of female patients was 34 (68%). Among the 50 patients 37 (74%) of patients were affected due to direct trivial fall and 13 (26%) of patients were road traffic accidents.

The successful treatment of unstable intertrochanteric fractures depends on many factors as age of the patient, general health, time from fracture to treatment, the adequacy of treatment, stability of fixation. The

angle of insertion of a nail during surgery also is an important factor, since the pre-stress of the nail depends on the angle of insertion [27]. In this study, patients of group B had lesser bleeding as compared to the group A patients because proximal reaming and insertion of a longer nail leading to opening of the medullary canal leads to increased blood loss [28]. The nail entry point has to be precise. Longer nails are recommended in elderly patients with significant osteoarthritis, because the entry point is more anatomically aligned as compared to the short nails. The operating surgeons are advised to refrain from hammering the nail in, however gentle the hammering process may be [29]. Long proximal femoral nail insertion require more operative time as compared with short proximal femoral nail [10-12,17-19] This is likely due to the need for free-hand placement of distal interlocking screws [8]. In a systematic review of the literature, operative time was reported to be 18.5 minutes shorter for short PFN and average blood loss was reported to be 86.7 ml compared with 135.2 ml for long PFN [18].

All the patients were evaluated and treated accordingly. Associated injuries were evaluated and treated simultaneously. The patients were operated on elective basis after overcoming the avoidable anesthetic risks. Short PFN took a mean operative time of 52.40 minutes while in long PFN group mean operative time was 61.10 minutes, which was longer compared to short PFN group. For short PFN mean duration of hospital stay was 5.07 days and 6.02 days for patients in group A.

Patients of both groups were followed up regularly 6 weeks, 12 weeks, 6 months and12 months. In our study the mean time for union was 12.6 weeks in group B patients who underwent procedure with short PFN and 14.3 weeks in patients of group A. Mean Harris hip score in group B at 1 year follow up was 84.45 and score group A at 1 year follow up was 89.45 which had a statistically significant difference. In group B1 (4%) patient shows complications as implant failure, which required implant removal and exchange nailing, 3(12%) patients complaint persistent hip pain and 2 among them were with superficial wound infection, which was treated with antibiotics. In group A, 3 (12%) patients complaint of thigh pain, 2 (8%) were with knee pain, 4 (16%) patients had superficial infection, which were cleared by specific antibiotics and 1(4%) with implant failure who underwent another procedure. Our results are consistent with a study by Hou Z et al. who concluded that there were no significant difference between the two treatment modalities, complication and reoperation rates for the 2 groups. Treatment with a long nail showed increase in procedure time and blood loss [30].

A study conducted by Nicholas B Frisch et al. came up with the result that short nails had the advantage of a faster surgery and lesser blood loss but had a higher rate of peri-implant fractures as compared to longer intramedullary nails. We had one patient in short PFN group with peri implant fracture [31].

V. Conclusion

The present study prevails that both implants shows better results in the management of unstable trochanteric fractures but short proximal femoral nail emerges as a better choice as compared to long proximal femoral nail because it shows better results, takes less operative time and prevents blood loss as compared to long proximal femoral nail.

References

[1]. Mundi S, Pindiprolu B, Simunovic N, Bhandari M. Similar mortality rates in hip fracture patients over the past 31 years. Acta Orthop 2014; 85: 54-59.
[2]. Bazylewicz DB, Egol KA, Koval KJ. Cortical encroachment after cephalomedullary nailing of the proximal femur: evaluation of a more anatomic radius of curvature. J Orthop Trauma. 2013 Jun;27(6):303-7.
[3]. Kleweno C, Morgan J, Redshaw J, Harris M, Rodriguez E, Zurakowski D, Vrahas M, Appleton P. Short versus long cephalomedullary nails for the treatment of intertrochanteric hip fractures in patients older than 65 years. J Orthop Trauma. 2014;28:391–7.
[4]. Y.Z. Zhang Hip fractures in the elderly—the chance and challenge for Chinese orthopedic surgeons Chin J Trauma, 30 (2014), pp. 193–195.
[5]. Hou Z, Bowen TR, Irgit KS, Matzko ME, Andreychik CM, Horwitz DS, Smith WR. Treatment of pertrochanteric fractures (OTA 31-A1 and A2): long versus short cephalomedullary nailing. J Orthop Trauma. 2013 Jun;27(6):318-24.
[6]. Heyse-Moore GH, MacEachern AG, Evans DCJ. Treatment of intertrochanteric fractures of the femur. J Bone Joint Surg Br. 1983;65:262–7.
[7]. Jensen JS, Sonne-Holm S, Tondevold E. Unstable trochanteric fractures.A comparative analysis of four methods of internal fixation.ActaOrthop Scand. 1980;51:949–62.
[8]. Baldwin PC3rd, Lavender RC, Sanders R, et al. Controversies in intramedullary fixation for intertrochanteric hip fractures. J Orthop Trauma. 2016;30:635–641.
[9]. ZainElabdien BS, Olerud S, Karlstrom G. Use of the Gamma nail in the treatment of fractures of the proximal femur. ClinOrthop. 1998;350:56-61.
[10]. Boone C, Carlberg KN, Koueiter DM, et al. Short versus long intramedullary nails for treatment of intertrochanteric femur fractures (OTA 31-A1 and A2). J Orthop Trauma. 2014;28:e96–100.
[11]. Hou Z, Bowen TR, Irgit KS, et al. Treatment of pertrochanteric fractures (OTA 31-A1 and A2): long versus short cephalomedullary nailing. J Orthop Trauma. 2013;27:318–324.
[12]. Kleweno C, Morgan J, Redshaw J, et al. Short versus long cephalomedullary nails for the treatment of intertrochanteric hip fractures in patients older than 65 years. J Orthop Trauma. 2014; 28:391–397.
[13]. Vaughn J, Cohen C, Vopat BG, et al. Complications of short versus long cephalomedullary nail for intertrochanteric femur fractures, minimum 1 year follow-up. Eur J Orthopaedic Surg Traumatol. 2015;25:665–670.247.

[14]. Lindskog DM, Baumgaertner MR. Unstable intertrochanteric hip fractures in the elderly. J Am Acad Orthop Surg. 2004;12:179–190.
[15]. Horwitz DS, Tawari A, Suk M. Nail length in the management of intertrochanteric fracture of the femur. J Am Acad Orthop Surg. 2016;24:e50–58.
[16]. Irgit K, Richard RD, Beebe MJ, et al. Reverse oblique and transverse intertrochanteric femoral fractures treated with the long cephalomedullary nail. J Orthop Trauma. 2015;29:e299–e304.
[17]. Li Z, Liu Y, Liang Y, et al. Short versus long intramedullary nails for the treatment of intertrochanteric hip fractures in patients older than 65 years. Int J Clin Exp Med. 2015;8:6299–6302.
[18]. Dunn J, Kusnezov N, Bader J, et al. Long versus short cephalomedullary nail for trochanteric femur fractures (OTA 31-A1, A2 and A3): a systematic review. J Orthop Traumatol. 2016;17:361–367.
[19]. Krigbaum H, Takemoto S, Kim HT, et al. Costs and complications of short versus long cephalomedullary nailing of OTA 31-A2 Proximal Femur Fractures in U.S. Veterans. J Orthop Trauma. 2016;30:125–129.
[20]. Cumming RG, Nevitt MC, Cummings SR. Epidemiology of hip fractures.Epidemiologic Reviews.1997; 19 (2): 244-57.
[21]. Domingo L, Cecilia D, Herrera A, Resines C. Trochanteric fractures treated with a proximal femoral nail. International Orthopaedics (SICOT) 2001;25(5):298-301.
[22]. Boldin C, Seibert FJ, Fankhauser F, Peicha G, Grechenig W, Szyszkowitz R. The proximal femoral nail (PFN)-a minimal invasive treatment of unstable proximal femoral fractures. A prospective study of 55 patients with a follow-up of 15 months. Acta Orthop Scand 2003;74(1):53-58.
[23]. Morihara T, Arai Y, Tokugawa S, Fujita S, Chatani K, Kubo T. Proximal femoral nail for treatment of trochanteric femoral fractures. J Orthop Surg (Hong Kong) 2007;15(3):273-7.
[24]. Schipper IB, Steyerberg EW, Castelein RM, Van der Heijden FHWM, Den Hoed PT, Kerver AJH et al. Treatment of unstable trochanteric fractures. Randomised comparison of the gamma nail and the proximal femoral nail. J Bone Joint Surg Br 2004;86(1):86-94.
[25]. Min WK, Kim SY, Kim TK, Lee KB, Cho MR, Ha YC et al. Proximal femoral nail for the treatment of reverse obliquity intertrochanteric fractures compared with gamma nail. J Trauma 2007;63(5):1054-60.
[26]. Pinilla T, Boardman K, Bouxsein M, Myers E, Hayes W. Impact direction from a fall influences the failure load of the proximal femur as much as age-related bone loss. 1996; 58(4): 231-235.
[27]. Eberle S, Gerber C, von Oldenburg G, Hungerer S, Augat P. Type of hip fracture determines load share in intramedullary osteosynthesis. Clin Orthop. 2009; 467 (8): 1972-1980.
[28]. Hou G, Zhou F, Tian Y, Ji H, Zhang Z, Guo Y et al. Predicting the need for blood transfusions in elderly patients with pertrochanteric femoral fractures. Injury. 2014; 45(12): 1932-7.
[29]. Hwang JH, Oh JK, Han SH, Shon WY, Oh CW. Mismatch between PFNa and medullary canal causing difficulty in nailing of the pertrochanteric fractures. Archives of orthopaedic and trauma surgery. 2008; 128(12): 1443-6. 21.
[30]. Hou Z, Shi J, Ye H, Pan Z. Treatment of unstable intertrochanteric fractures with percutaneous non-contact bridging plates. Int J Surg 2014;12(5):538-43.
[31]. Frisch NB, Nahm NJ, Khalil JG, Les CM, Guthrie ST, Charters MA. Short Versus Long Cephalomedullary Nails for Pertrochanteric Hip Fracture. Orthopedics. 2017;40(2):83-8.

Dr. Suhail Shabnum Wani, et. al. "Comparison between short and long proximal femoral nail in unstable intertrochanteric femur fractures." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(05), 2022, pp. 50-55.