

Frequency of Union of Shaft of Femur Fracture Stabilized with Unreamed Interlocking Nail in Adult Patients

Inam M, Noor W, Khan I*, Ali MA and Shabir M

Department of Orthopedic and Trauma Medical Teaching Institute Lady Reading Hospital Peshawar, Pakistan

*Corresponding author:

Dr Imran Khan,
Department of Orthopaedic and Trauma,
Medical Teaching Institute Lady Reading
Hospital Peshawar, Pakistan,
E-mail: drminamkhan71@gamil.com

Received: 10 Apr 2023

Accepted: 01 May 2023

Published: 10 May 2023

J Short Name: COS

Copyright:

©2023 Khan I, This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

Keywords:

Femur; Fracture; Inter locking nails; Shaft; Union; Unreamed

Citation:

Khan I. Frequency of Union of Shaft of Femur Fracture Stabilized with Unreamed Interlocking Nail in Adult Patients. Clin Surg. 2023; 9(4): 1-5

1. Abstract

1.1. Introduction: Fractures of the femoral shaft are one of the most common injuries treated by orthopedic surgeons. Shaft of femur fracture commonly result from high energy mechanisms such as motor vehicle collisions with sequelae of limb shortening and deformities if not treated appropriately¹. In this study we will evaluate the functional outcome of shaft of femur fracture stabilize with unreamed ILN in the local population presenting to orthopaedics unit of Lady Reading teaching hospital Peshawar (LRH).

1.2. Objective: To determine the frequency of union of unreamed inter locking nails in fracture of femur shaft in the patients presenting to orthopedic unit of a Tertiary care hospital of the province.

1.3. Material and Methods: This descriptive case series Study was conducted in the Department Orthopedics, Medical Teaching Institute Lady Reading Hospital Peshawar Pakistan from November 2021 to May 2022. All the demographic data of the patients were recorded. Height of the patient in meters was recorded using a stadiometer. Patients were also asked about any history of previous pathology, malignancy or any chronic bone illness. Then those patients undergoing unreamed ILN for open or closed femur shaft fracture was assessed pre and post operatively and was followed for outcome.

1.4. Results: Our study shows that among 139 patients, Mean age was 44 years with SD ± 10.22. 104(75%) patients were male and 35(25%) patients were female. Moreover 132(95%) patients had union of unreamed ILN while 7(5%) patients didn't had union of unreamed ILN.

clinicsofsurgery.com

1.5. Conclusion: Our study concludes that the frequency of union of unreamed inter locking nails was 95% in fracture of femur shaft in the patients presenting to orthopedics unit of LRH.

2. Introduction

Fractures of the femoral shaft are one of the most common injuries treated by orthopedic surgeons. Shaft of femur fracture commonly result from high energy mechanisms such as motor vehicle collisions with sequelae of limb shortening and deformities if not treated appropriately [1]. Femoral shaft fractures typically occur in a bimodal distribution, high-energy trauma in the young population, and lower energy trauma in the elderly population. Femur shaft fracture is a fracture of the femoral diaphysis occurring between 5cm distal to the lesser trochanter and 5cm proximal to adductor tubercle. The frequency of shaft of femur fracture has increased in the recent times because of increase in the number of road traffic accident and natural disasters. Femoral shaft fracture frequency is about 37 per 100000 annually with the peak age in young population is 16 to 60 years [2]. AO-Muller/Orthopedics Trauma Association (AO/OTA) system is used for the classification for femur fracture [3].

Treatment of femoral shaft fractures can be operative or non-operative. Operative fixation with intramedullary nailing is the gold standard of treatment in the high-income countries. Other operative techniques include plate osteosynthesis and external fixation. Closed treatment with traction, splinting, and casting may be temporary treatment or definitive treatment in specific cases [4,5]. Inter locking nails (ILN) are considered first choice of managing

femur shaft fracture.⁴ There are two main methods of ILN that is reamed and unreamed ILN having different prognostic importance. Both are safe and effective methods of treating femur fracture but having its pros and cons. Reamed ILN have low complication rate with union rate of 95 % in the non-communicated femoral shaft fractures. The disadvantage of reaming such as high rates of peri-operative and postoperative mortality which is caused by condition such as air and fat embolism which are thought to be result from both the local and systemic effect of reaming. The advantage of unreamed ILN is reported to have less time consuming and less blood loss intra-operatively and favorable results like healing and early mobilization than reamed ILN [6,7]. Weresh et al has described that unreamed ILN techniques is strongly associated with the healing propensity⁸. As our hospital is a very busy trauma centre and receiving a large number of patients on daily basis and the incidence of shaft of femur fracture in our population is high. Limited data is available locally about unreamed ILN in shaft of femur fracture. In this study we will evaluate the functional outcome of shaft of femur fracture stabilize with unreamed ILN in the local population presenting to orthopedics unit of Lady Reading teaching hospital Peshawar (LRH).

3. Material and Method

This descriptive case series Study was conducted in the Department Orthopedics, Medical Teaching Institute Lady Reading Hospital Peshawar Pakistan from November 2021 to May 2022 on 139 patients (calculated by WHO calculator, keeping the confidence interval 95%, standard deviation 1.96, the margin of error 0.05 and 0.9 expected proportion of union of shaft of femur fracture treated with unreamed ILN). Non-probability consecutive sampling technique was used in our study. All Adult patients aged from 16 to 60 years with Both genders having Closed Isolated, unilateral or bilateral femoral shaft fractures and Patients having ASA score of I and II were include in the study while Patients with pathological fracture, having previous surgeries, metabolic bone disease or Diabetic and smoker patients were excluded from the study.

The study was conducted after getting approval from hospital ethics and research committee. The patients meeting the inclusion criteria in the orthopedics unit of Lady Reading Hospital Peshawar was recruited in the study after taking written informed consent. All the demographic data e.g. age and gender of the patients were recorded. Height of the patient in meters was recorded using a stadiometer. Patients were also asked about any history of previous pathology, malignancy or any chronic bone illness. Then those patients undergoing unreamed ILN for open or closed femur shaft fracture was assessed pre and post operatively and was followed for outcome. All patients contact numbers and relevant data was be recorded on a predesigned proforma for subsequent analysis. The data was analyzed using SPSS version 23.

4. Results

Our study shows that among 139 patients, 40(29%) patients were in age between 16-30 years and 99(71%) patients were in age between 31-60 years (Table 1). 104(75%) patients were male and 35(25%) patients were female. (Table 2). 92(66%) patients had height < 1.4 meters and 47(34%) patients had height > 1.4 meters (Table 3). 4(3%) patients had chronic pathology of bone, 135(97%) patients didn't had chronic pathology of bone (Table 4). 3(2%) patients had previous history of bone malignancy or failed ILN, 136(98%) patients didn't had previous history of bone malignancy or failed ILN (Table 5). 51(37%) patients had proximal shaft fracture, 63(45%) patients had middle shaft fracture and 25(18%) patients had distal shaft fracture (Table 6). Moreover 132(95%) patients had union of unreamed ILN while 7(5%) patients didn't had union of unreamed ILN (Table 7). Stratification of union of unreamed ILN with respect to age, gender, height, presence/absence of chronic pathology of bone, previous history of bone malignancy or failed ILN, and fracture is mentioned in (Table 8-13).

Table 1: Age Distribution (n=139)

AGE	FREQUENCY	PERCENTAGE
16- 30 years	40	29%
31-60 years	99	71%
Total	139	100%

Mean age was 44 years with SD \pm 10.22

Table 2: Gender Distribution (n=139)

GENDER	FREQUENCY	PERCENTAGE
Male	104	75%
Female	35	25%
Total	139	100%

Table 3: Height Distribution (n=139)

Height	FREQUENCY	PERCENTAGE
\leq 1.4 meters	92	66%
> 1.4 meters	47	34%
Total	139	100%

Mean height was 1.5 meters with SD \pm 0.21

Table 4: Chronic Pathology of Bone (n=139)

CHRONIC PATHOLOGY OF BONE	FREQUENCY	PERCENTAGE
Present	4	3%
Absent	135	97%
Total	139	100%

Table 5: Previous History of Bone Malignancy or Failed ILN (n=139)

PREVIOUS HISTORY	FREQUENCY	PERCENTAGE
Yes	3	2%
No	136	98%
Total	139	100%

Table 6: Type of Fracture (n=139)

TYPE OF FRACTURE	FREQUENCY	PERCENTAGE
Proximal shaft	51	37%
Middle shaft	63	45%
Distal shaft	25	18%
Total	139	100%

Table 7: Union of Unreamed Inter Locking Nail (n=139)

UNION OF UNREAMED ILN	FREQUENCY	PERCENTAGE
UNION	132	95%
Non-UNION	7	5%
Total	139	100%

Table 8: Stratification of Union of Unreamed Inter Locking Nail with Respect to Age (n=139)

UNION OF UNREAMED ILN	16- 30 years	31-60 years	total	P value
UNION	39(98%)	93(94%)	132(95%)	0.384
Non-UNION	1(2%)	6(6%)	7(5%)	
Total	40(100%)	99(100%)	139(100%)	

chi square test was applied

Table 9: Stratification of Union of Unreamed Inter Locking Nail with Respect to Gender Distribution (n=139)

UNION OF UNREAMED ILN	Male	Female	Total	P value
UNION	99(95%)	33(94%)	132(95%)	0.831
Non-UNION	5(5%)	2(6%)	7(5%)	
Total	104(100%)	35(100%)	139(100%)	

chi square test was applied

Table 10: Stratification of Union of Unreamed Inter Locking Nail with Respect to Height Distribution (n=139)

UNION OF UNREAMED ILN	≤ 1.4 meters	> 1.4 meters	Total	P value
UNION	89(97%)	43(91%)	132(95%)	0.181
Non-UNION	3(3%)	4(9%)	7(5%)	
Total	92(100%)	47(100%)	139(100%)	

chi square test was applied.

Table 11: Stratification of Union of Unreamed Inter Locking Nail with Respect to Chronic Pathology of Bone (N=139)

UNION OF UNREAMED ILN	Present	Absent	Total	P value
UNION	0(00%)	132(98%)	132(95%)	<0.001
Non-UNION	4(100%)	3(2%)	7(5%)	
Total	4(100%)	135(100%)	139(100%)	

chi square test was applied

Table 12: Stratification of Union of Unreamed Inter Locking Nail with Respect to Previous History of Bone Malignancy or Failed ILN (n=139)

UNION OF UNREAMED ILN	Yes	No	Total	P value
UNION	0(00%)	132(97%)	132(95%)	<0.001
Non-UNION	3(100%)	4(3%)	7(5%)	
Total	3(100%)	136(100%)	139(100%)	

chi square test was applied

Table 13: Stratification of Union of Unreamed Inter Locking Nail with Respect to Type of Fracture (N=139)

UNION OF UNREAMED ILN	Proximal	Middle	Distal	total	P value
UNION	48(94%)	60(95%)	24(96%)	132(95%)	0.931
Non-UNION	3(6%)	3(5%)	1(4%)	7(5%)	
Total	51(100%)	63(100%)	25(100%)	139(100%)	

5. Discussion

Fractures of the femoral shaft are one of the most common injuries treated by orthopedic surgeons. Shaft of femur fracture commonly result from high energy mechanisms such as motor vehicle collisions with sequelae of limb shortening and deformities if not treated appropriately [1]. Femoral shaft fractures typically occur in a bimodal distribution, high-energy trauma in the young population, and lower energy trauma in the elderly population. Femur shaft fracture is a fracture of the femoral diaphysis occurring between 5cm distal to the lesser trochanter and 5cm proximal to adductor tubercle. The frequency of shaft of femur fracture has increased in the recent times because of increase in the number of road traffic accident and natural disasters. Femoral shaft fracture frequency is about 37 per 100000 annually with the peak age in young population is 16 to 60 years [2]. AO-Muller/Orthopedics Trauma Association (AO/OTA) system is used for the classification for femur fracture [3].

Our study shows that among 139 patients, 40(29%) patients were in age between 16-30 years and 99(71%) patients were in age between 31-60 years. 104(75%) patients were male and 35(25%) patients were female. 92(66%) patients had height < 1.4 meters and 47(34%) patients had height > 1.4 meters. 4(3%) patients had chronic pathology of bone, 135(97%) patients didn't had chronic pathology of bone. 3(2%) patients had previous history of bone malignancy or failed ILN, 136(98%) patients didn't had previous history of bone malignancy or failed ILN. 51(37%) patients had proximal shaft fracture, 63(45%) patients had middle shaft fracture and 25(18%) patients had distal shaft fracture. Moreover 132(95%) patients had union of unreamed ILN while 7(5%) patients didn't had union of unreamed ILN.

Similar findings were observed in another study carried out by Rafi Ullah et al [9], in which the total number of patients in our study were 214. The mean age of our study participant was 45.47 ± 9.65 years. Male patients were 133(62.15%) and female 88(37.85%). Majority (87.85%, n=188) patients revealed clinical and radiological union at nine months while 26(12.1%) patients had non-union. No major complication noted.

In another study carried out by Moumni ME et al [10], had reported that sixty-six patients had suffered multiple injuries. 21 fractures were open. According to the AO classification, there were 54 type A, 42 type B, and 14 type C fractures. Dynamic proximal locking was performed in 44 cases (36 type A and 8 type B fractures). Non-union occurred in two patients (1.9%; one type B and one type C fractures). Intra-operative complications were seen in

three patients (2.8%). Postoperative in-hospital complications occurred in 29 patients (27%). Local superficial infection occurred in two patients (1.9%), there were no cases of deep infection. Implant failure occurred in three patients (2.8%); nail breakage was seen in two patients. In another study carried out by Ma YG et al [11], had reported that the incidence of femoral nonunion was 97.2% and non-union was 2.8% in patients with closed simple fracture undergoing interlocking intramedullary nailing. Eleven cases of them had hypertrophic nonunions, characterized by evident callus formation but with clear fracture line. Nonunion was correlated significantly with distal fracture, unsatisfactory reduction and unreamed nail ($p < 0.05$). There was no significant difference between antegrade nail and retrograde nail ($p > 0.05$).

6. Conclusion

Our study concludes that the frequency of union of unreamed inter locking nails was 95% in fracture of femur shaft in the patients presenting to orthopedics unit of LRH.

References

- Koso RE, Terhoeve C, Steen RG, Zura R. Healing, nonunion, and re-operation after internal fixation of diaphyseal and distal femoral fractures: a systematic review and meta-analysis. *Int Orthop*. 2018; 42(11): 2675-83.
- Wu KJ, Li SH, Yeh KT, Chen IH, Lee RP, Yu TC, et al. The risk factors of nonunion after intramedullary nailing fixation of femur shaft fracture in middle age patients. *Medicine (Baltimore)*. 2019; 98(29): e16559.
- Meinberg EG, Agel J, Roberts CS, Karam MD, Kellam JF. Fracture and Dislocation Classification Compendium-2018. *J Orthop Trauma*. 2018; 32 Suppl 1: S1-s170.
- Metsemakers WJ, Roels N, Belmans A, Reynders P, Nijs S. Risk factors for nonunion after intramedullary nailing of femoral shaft fractures: Remaining controversies. *Injury*. 2015; 46(8): 1601-7
- Rommens PM. Paradigm shift in geriatric fracture treatment. *Eur J Trauma Emerg Surg*. 2019; 45(2): 181-9.
- Pitts CC, Montgomery TP, Hess MC, Smith WR, Quade JH. Reamed Versus Unreamed Intertrochanteric Femur Fractures, Is It Time? *J Orthop Trauma*. 2020; 34(5): 252-7.
- Selvakumar K, Saw KY, Fathima M. Comparison study between reamed and unreamed nailing of closed femoral fractures. *Med J Malaysia*. 2001; 56 Suppl D: 24-8.
- Guimarães JA, Duarte ME, Fernandes MB, Vianna VF, Rocha TH, Bonfim DC, et al. The effect of autologous concentrated bone-marrow grafting on the healing of femoral shaft non-unions after locked intramedullary nailing. *Injury*. 2014; 45 Suppl 5: S7-s13.

9. Rafi Ullah, Hussain A, Iqbal J, Imran A, Saddiq S, Ahmed N. Frequency of union in open tibia fractures treated with unreamed intramedullary interlocking nails. *J Pak Orthopaedic Asso*, 2020; 32(02): 87-91.
10. Moumni ME, Leenhouts PA, Duis HJ. The incidence of non-union following unreamed intramedullary nailing of femoral shaft fracture. *Injury*. 2009; 40(2): 205-8
11. Ma YG, Hu GH, Hu W, Liang F. Surgical factors contributing to nonunion in femoral shaft fracture following intramedullary nailing. *Chin J Traumatol*. 2016; 19(2): 109-12.