

ORIGINAL RESEARCH

Evaluation of retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur

¹Dr. Sushant Balakrishnan, ²Dr. Momin Bin Latheef

^{1,2}Assistant Professor, Dept of Orthopedics, Sree Utradom Thirunal Academy of Medical Sciences, Thiruvananthapuram, India

Correspondence:

Dr. Momin Bin Latheef

Assistant Professor, Dept of Orthopedics, Sree Utradom Thirunal Academy of Medical Sciences, Thiruvananthapuram, India

ABSTRACT

Background: The distal 1/3rd femoral fractures constitute 6% of all femoral fractures. The present study was conducted to evaluate results of retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur.

Materials & Methods: 58 patients of distal 1/3rd fractures of femur of both gender were treated by retrograde nailing. Parameters noted were mode of injury, type of fracture, ROM, time from injury, duration of the surgery, time for fracture healing, and functional assessment by Lysholm knee scoring etc.

Results: Out of 58 patients, 32 were males and 26 were females. Mode of injury was RTA in 32, sports injury in 12, fall in 8 and others in 6 patients. Fracture type was closed in 30 and compound in 28 cases. Mean flexion at knee (degree) at 1 month was 42.6, at 3 months was 90.2, at 6 months was 112.5 and at 12 months was 121.4. The difference was significant ($P < 0.05$). Lysholm knee scoring was excellent in 36, good in 14 and fair in 8 patients. The difference was significant ($P < 0.05$).

Conclusion: Authors found that retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur is adequate treatment options for distal femur fractures.

Key words: femoral fractures, Retrograde nailing, Lysholm knee scoring

INTRODUCTION

Distal 1/3rd femoral fractures constitute 6% of all femoral fractures. These fractures occur in bi-modal distribution as high energy trauma in younger age group and low energy fractures due to osteoporosis in the elderly age group. Due to extensive comminution, soft tissue damage, an extension of the fracture into the knee joint, neurovascular damage and injury to the extensor mechanism, these injuries are complicated and difficult to manage.^{1,2}

The goals of treatment follow AO principles of anatomic reduction of the articular surface, restoration of limb alignment, length, and rotation. Despite improvements in implant design, management of distal femur fractures remains a challenge; fractures are often comminuted, intra-articular, and involve osteoporotic bone, making fixation challenging to achieve. In the geriatric trauma population, the incidence of co-morbidities is high and may impact the therapeutic options.³

Retrograde nailing is a viable option for the treatment of distal femur fractures. The advantages of retrograde nailing is that, the intramedullary nail is a load-sharing device compared to plate fixation, the nail may be inserted through smaller incisions causing less soft tissue disruption, and it allows for the treatment of ipsilateral hip and ipsilateral tibia

fractures in the polytrauma patient.⁴The present study was conducted to evaluate retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur.

MATERIALS & METHODS

The present study comprised of 58 patients of distal 1/3rd fractures of femur of both gender who presented either to outpatient department or emergency room of Sree Uthradom Thirunal Academy of Medical Sciences between January 2017 and December 2021. Permission was granted from the hospital ethical committee for the study. Consent for the study was obtained from all enrolled patients.

The intramedullary supracondylar nail is available in lengths of 15, 20 and 25 cm and serial diameters of 11, 12 and 13 mm. The surgery was performed on a radiolucent operation table with the patient in the supine position with the knee flexed to 45 deg. Intercondylar fractures were first stabilized with 2 percutaneously placed K wires. Arthrotomy was done in cases of intra-articular comminuted fractures. Access for the retrograde nailing was 53 times through the patellar tendon, 3 times through a medial arthrotomy and 2 times through a lateral arthrotomy. These approaches depended purely on the surgeon's preference and on the fracture type. The starting point was located with the fluoroscope, and the medullary canal was initiated with a curved awl. An intramedullary guide pin is passed into the femoral canal, and except in osteoporotic fractures, intramedullary reaming was performed to make the entry point 1 mm larger than the selected nail diameter. The intramedullary supracondylar nail was then inserted over the guide-wire under guidance of fluoroscope. To achieve optimal stabilisation, preference was given for the longest and thickest nail possible. The nail was locked with at least 2 screws proximally and distally.

Data such as name, age, gender etc. was recorded. All patients were treated by retrograde nailing. Parameters such as mode of injury, type of fracture, ROM, time from injury, duration of the surgery, time for fracture healing, functional assessment by Lysholm knee scoring etc. was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 58		
Gender	Males	Females
Number	32	26

Table I shows that out of 58 patients, males were 32 and females were 26.

Table II Assessment of parameters

Parameters	Variables	Number	P value
Mode of injury	RTA	32	0.04
	Sports injury	12	
	Fall	8	
	others	6	
Type of fracture	Closed	30	0.94
	Compound	28	
Mean flexion at knee (degree)	At 1 month	42.6	0.05
	3 months	90.2	
	6 months	112.5	
	12 months	121.4	

Table II, graph I shows that mode of injury was RTA in 32, sports injury in 12, fall in 8 and others in 6 patients. Fracture type was closed in 30 and compound in 28 cases. Mean flexion at knee (degree) at 1 month was 42.6, at 3 months was 90.2, at 6 months was 112.5 and at 12 months was 121.4. The difference was significant ($P < 0.05$).

Graph I Assessment of parameters

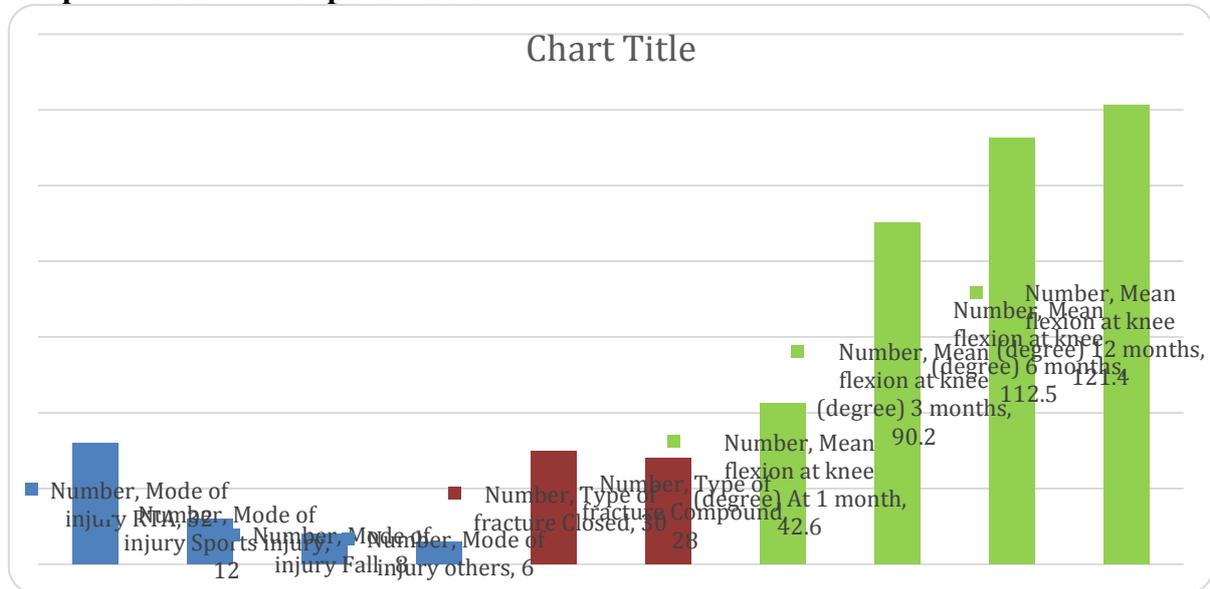


Table III Assessment of functional by Lysholm knee scoring

Lysholm knee scoring	Number	P value
Excellent	36	0.01
Good	14	
Fair	8	
poor	0	

Table III shows that Lysholm knee scoring was excellent in 36, good in 14 and fair in 8 patients. The difference was significant ($P < 0.05$).

DISCUSSION

Distal femur fractures include fractures of the supracondylar and intercondylar region of the distal femur and are relatively common injuries. To avoid the high morbidity and mortality correlating with this fracture, it requires prompt diagnosis and treatment.⁵The distal 1/3rd femoral fractures constitute 6% of all femoral fractures. These fractures occur in bi-modal distribution as high energy trauma in younger age group and low energy fractures due to osteoporosis in the elder age group.⁶Retrograde nails of standard-length should extend to the level of the lesser trochanter to prevent a stress riser in the subtrochanteric region. Newer implants with options for multiple distal screw fixation allow for the restoration of the articular surface for simple intra-articular fractures.⁷ Biomechanical studies demonstrate that the number, orientation of the distal locking screws, and quality of distal screw purchase are essential components in determining the strength of a nail.⁸The present study was conducted to evaluate retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur.

We found that out of 58 patients, males were 32 and females were 26. Mode of injury was RTA in 32, sports injury in 12, fall in 8 and others in 6 patients. Shekhareswar De⁹investigated its effectiveness in fixation of distal 1/3rd fracture of femur with special emphasis on the outcome and inherent surgical challenges. In the present study, out of 20 study subjects there were 7 patients (35%) in the age group of 31-40 years followed by 6

patients (30%) were in the age group of 31-40 years, 4 patients (20%) were in the age group of 41-50 years, 2 patients (10%) in the age group of 51-60 years with mean age of the patients was 43.6 ± 17.67 years. There were 17 patients (85%) male and 3 patients (15%) female. The mode of injury in case of majority of the patients had RTA [road traffic accidents] 11 patients (55%), followed by fall from height 5 patients (25%), sports injury 2 patients (10%) and domestic injuries 2 patients (10%). Mean time from the injury to operation was 3 days. The mean duration of the surgery was 100 mins. Majority of the patients 16 (80%) had isolated femoral fractures while others 4 patients (20%) had polytrauma. Mean time of the fracture healing was 18.5 weeks [SD \pm 6.75]. The post-operative knee range of motion (ROM) achieved; 8 patients (40%) had 125°, 4 patients (20%) had 135°, 2 patients (10%) had 140°, 2 patients (10%) had 105°, 3 patients (10%) had 110°, 1 patient (5%) had 115°, and with mean of 123.75° post-operatively.

We found that fracture type was closed in 30 and compound in 28 cases. Mean flexion at knee (degree) at 1 month was 42.6, at 3 months was 90.2, at 6 months was 112.5 and at 12 months was 121.4. Prasanna A et al¹⁰ evaluated and compared the clinical and the radiological outcomes of distal 1/3rd femoral fractures stabilization using retrograde nailing constructs. 113 cases underwent surgical management with distal femoral retrograde nailing. The results were analyzed according to Lysholm's knee scoring showed excellent in 55 cases (48.67%), good in 39 cases (34.51%), fair in 11 cases (9.73%) and poor in 8 cases (7.07%). The correlation analysis with Pearson's correlation coefficient (r) was 0.8 which show a highly positive correlation between the union of distal femoral fracture and retrograde distal femoral nailing.

We observed that Lysholm knee scoring was excellent in 36, good in 14 and fair in 8 patients. Hierholzer C et al¹¹ evaluated and compare outcome of distal femur fracture stabilization using RN or LISS techniques. They analyzed 115 patients with distal femur fracture who had been treated by retrograde IM nailing (59 patients) or LISS plating (56 patients). Mechanism of injury was high energy impact in 57% (53% RN, 67% LISS) and low-energy injury in 43% (47% RN, 33% LISS), respectively. Fractures were classified according to AO classification: there were 52 type A fractures (RN 31, LISS 21) and 63 type C fractures (RN 28, LISS 35); 32% (RN) and 56% (LISS) were open and 68% (RN) and 44% (LISS) were closed fractures, respectively. Functional and radiological outcome was assessed. The following complications were treated: hematoma formation (one patient RN and three patients LISS), superficial infection (one patient RN and three patients LISS), deep infection (2 patients LISS). Additional secondary bone grafting for successful healing 3 months after the primary operation was required in four patients in the RN (7% of patients) and six in the LISS group (10% of patients). Differences between groups for type A were statistically insignificant, statistical analysis for type C fractures between the two groups are not possible, since in type C2 and C3 fractures only LISS plating was performed.

CONCLUSION

Authors found that retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur is adequate treatment options for distal femur fractures.

REFERENCES

1. Acharya KN, Rao MR. Retrograde nailing for distal third femoral shaft fractures: a prospective study. *J Orthop Surg (Hong Kong)*. 2006 Dec;14(3):253-8.
2. Hierholzer C, von Räden C, Pötzel T, Woltmann A, Bühren V. Outcome analysis of retrograde nailing and less invasive stabilization system in distal femoral fractures: A retrospective analysis. *Indian J Orthop*. 2011;45(3):243-250.

3. Gao K, Gao W, Huang J, Li H, Li F, Tao J, Wang Q. Retrograde nailing versus locked plating of extra-articular distal femoral fractures: comparison of 36 cases. *Med PrincPract.* 2013;22(2):161-6.
4. Acharya KN, Rao MR. Retrograde nailing for distal third femoral shaft fractures: a prospective study. *J OrthopSurg (Hong Kong).* 2006 Dec;14(3):253-8.
5. Gangavalli AK, Nwachuku CO. Management of Distal Femur Fractures in Adults: An Overview of Options. *OrthopClin North Am.* 2016 Jan;47(1):85-96. 20. Hake ME, Davis ME, Perdue AM, Goulet JA. Modern Implant Options for the Treatment of Distal Femur Fractures. *J Am AcadOrthop Surg.* 2019 Oct 1;27(19):e867-875.
6. Von Keudell A, Shoji K, Nasr M, Lucas R, Dolan R, Weaver MJ. Treatment Options for Distal Femur Fractures. *J Orthop Trauma.* 2016 Aug;30Suppl 2:S25-7.
7. Ehlinger M, Ducrot G, Adam P, Bonnomet F. Distal femur fractures. Surgical techniques and a review of the literature. *OrthopTraumatolSurg Res.* 2013 May;99(3):353-60.
8. Nagla A, Manchanda A, Gupta A, Tantuway V, Patel V, Arshad N. Study to evaluate the outcomes of surgical stabilization of distal 1/3rd fracture shaft femur with retrograde nailing. *Int J Res Orthop* 2017;3:96-102.
9. Shekhareswar De, Samuel Lakra. Outcome analysis of retrograde nailing for surgical stabilization of distal 1/3rd fracture shaft femur: A hospital- based study. *International Journal of Health and Clinical Research,* 2021;4(20):365-369.
10. Prasanna A, Jeyaraman M, Chaudhari K, Ajay SS, Sabarish K, et al. (2019) Prospective Study on Functional Outcome of Retrograde Femoral Nailing in Distal Third Femoral Fractures. *J ClinExpOrthop* 2019;2:65.
11. Hierholzer C, von Rüden C, Pötzel T, Woltmann A, Bühren V. Outcome analysis of retrograde nailing and less invasive stabilization system in distal femoral fractures: a retrospective analysis. *Indian journal of orthopaedics.* 2011 Jun;45(3):243-50.