

Post-operative Functional Outcome in Fracture Distal Shaft of Femur Treated with Retrograde Nailing

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Abstract

Background: To determine the functional outcome of retrograde femoral nailing in terms of Tegner Lysholm score for distal femoral fractures.

Methods: This prospective cross-sectional study was done at the Department of Orthopaedics, Benazir Bhutto Hospital, Rawalpindi from 20th January 2018 to 19th January 2019. The study comprised of 35 patients who presented with a simple, extra-articular distal femur fracture. All patients were treated with retrograde femoral nailing using anterior (Para patellar) approach. Functional outcome was assessed at 6-months using Tegner Lysholm score. Data were analyzed using SPSS version 22.

Results: Out of the 35 patients, the majority were females (60%). Mean age of patients was 51.4±11.4 years. Most common age group in males was 41-50 years while in females it was 61 years and above. Average BMI of patients was 22.7±2.8 kg/m². At 6-months post-operatively, Tegner Lysholm score was between 86-100, 71-85 and 56-70 in 65.7%, 25.7% and 8.6% cases, respectively. Tegner Lysholm score between genders was insignificant.

Conclusion: Retrograde femoral nailing has excellent functional outcome in patients with extra-articular distal femoral fractures.

Keywords: Distal femur fracture, Retrograde nailing, Tegner Lysholm score.

Introduction

Fractures of the distal femoral shaft are less common and represent 3% to 6% of femur fractures.¹ These

fractures have a bi-modal distribution with younger patients mostly males due to high-energy trauma and older patients commonly females sustaining this injury with low-energy trauma.² In elderly patients,

the high prevalence is due to osteoporosis.³ These fractures have high morbidity and mortality, especially in the older age group.⁴ Road-traffic accidents (RTA) are the predominant mode of these injuries.⁵ AO classification Type-A (extra-articular) is the most common type of distal femoral fractures.⁶ Various modes of treatment of these fractures have been employed with variable results.⁷

The technique of retrograde nailing for distal femoral shaft fracture was first described was Green in the 70s.⁸ Before this, the plating was considered the gold standard procedure for these fractures. Nailing has the advantage of involving less soft-tissue dissection, preservation of periosteal blood flow, favourable healing and early recovery when compared to the plating.⁹ For decades, anterograde nailing was considered the only option, but favourable results were not obtained in distal diaphyseal and supracondylar femoral fractures.¹⁰ Retrograde intramedullary femoral nailing, not only fixes the distal femoral fractures but also can be used to manage intra-articular fractures and those in association with ipsilateral patellar and tibial fractures.¹¹ Another risk with anterograde femoral nailing is iatrogenic femoral neck fracture having an incidence of 9% as reported in the literature.¹² These ipsilateral necks and intertrochanteric femur fractures can be managed with retrograde nailing in a better way.¹³ Retrograde femoral nailing is the gold standard procedure in polytraumatic patients involving femur, vascular injury or systemic compromise.¹⁴ Despite being considered as the go-to option, the most feared complication of retrograde nailing is anterior knee pain.¹⁵

Considering the advantages and complications, very scarce data is available on the functional outcome of retrograde femoral nailing in literature. Therefore, the purpose of this study was to determine the functional outcome of retrograde femoral nailing in terms of Tegner Lysholm score in our local population, so that in future surgeons can take this into account.

Methodology

This prospective cross-sectional study was conducted in a major trauma centre located at Benazir Bhutto Hospital, Rawalpindi, Pakistan. Duration of study was from 20th January 2018 to 19th January 2019. Patients with simple, extra-articular, supracondylar femur fractures aged between 20 to 65 years belonging to either gender confirmed using anteroposterior and

lateral radiographs of the femur with knee were included in the study after approval from ethical review committee of the institute. Exclusion criteria were intra-articular femur fracture, open fracture, fracture shaft/neck of femur, polytrauma, history of previous surgery of same knee/femur, infected knee/femur, pathological fracture, flexion deformity of the knee, and congenital bony diseases like osteogenesis imperfect, poliomyelitis, etc. Using convenient sampling, all patients were operated under spinal anaesthesia by the same Orthopaedic and trauma surgeon with more than five years' experience of managing such injuries. Intravenous cephalosporin according to body weight was given to all patients 20 minutes prior to making an incision.

The operative technique involved placing the patient supine with the knee placed in 30-degree flexion. Using the anterior (Para patellar) approach to the intercondylar notch, a 2cm incision was given along the medial third of the patellar tendon, cutting through the subcutaneous tissue and retracting the tendon laterally. Using C-arm fluoroscope, guide-pin was inserted into the centre of the intercondylar notch, just superior to Blumensaat's line. Entry reamer with soft-tissue protector was then inserted. After removing reamer and pin, ball tip guide-wire attached to a T-handle was inserted into the medullary canal. Then fracture was reduced by pulling traction. Once ensuring fracture reduction, guide-wire was inserted past the fracture site up to the lesser trochanter. After reaming, the appropriate sized nail was inserted. Proximal and distal screws were locked at the end. The intravenous antibiotic was continued 2 days post-operatively.

Post-operative rehabilitation involved quadriceps strengthening and hip-knee range of motion exercises from the first post-operative day. During the first 6-weeks, partial weight-bearing as tolerated by the patient was commenced. Full weight-bearing started after confirming the appearance of callus on follow-up radiographs. Patients were discharged on the 3rd postoperative day and they were followed up at 2, 6, 12 and 24 weeks post-operatively. On the first follow-up, stitches were removed and like-wise on each subsequent visit radiographs were done. The functional outcome assessed using Tegner Lysholm score at 24 weeks post-operatively. This functional scale has a maximum score of 100. Scores between 86-100, 71-85 and 56-70 were graded as excellent, good and fair, respectively.

Data regarding age, gender, side of limb involvement, body mass index (BMI) and Tegner Lysholm score was

collected. Data was stratified for age, gender and BMI to control confounding. Data were analysed with SPSS version 22. Categorical variables were presented in frequencies and percentages and compared using the chi-square test while continuous variables with means and standard deviation.

Result

Out of the 35 patients, 14 (40%) were male and 21 (60%) females. Male to female ratio was 1:1.5. There was a bimodal age distribution pattern among males and females as shown in Figure-1. Mean age of patients was 51.4±11.4 years. Male patients had a mean age of 40.5±7.5 years while it was 58.7±6.7 years in females (p=0.3).

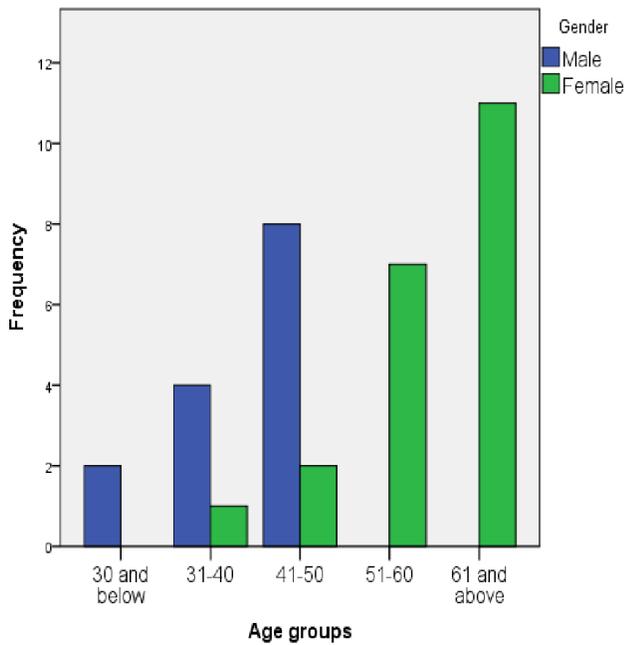


Figure 1: Age distribution between genders

Average BMI of patients was 22.7±2.8 kg/m². Male patients had a mean BMI of 21.6±2.3 kg/m² while in females it was 23.4±2.9 kg/m² (p=0.2). The pattern of BMI distribution between genders is shown in the box plot labelled as Figure-2.

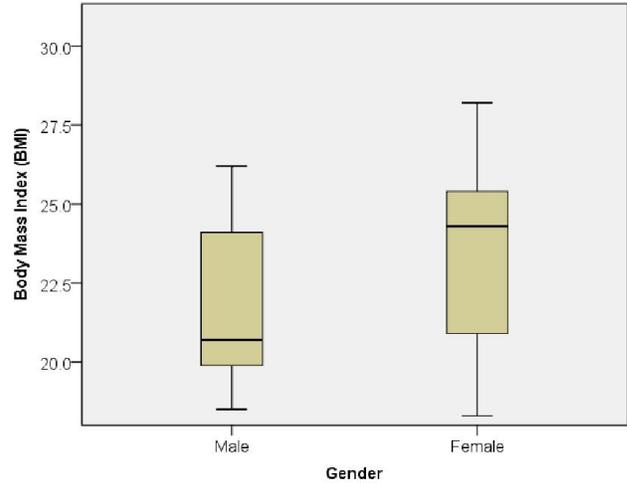


Figure 2: Distribution of BMI between genders

In 20 (57.1%) patients right leg was involved while in 15 (42.9%) there was left-sided involvement (p=1.0). At 6 months postoperatively, Tegner Lysholm score was excellent in 23, good in 9 and fair in 3 cases as shown in Figure-3.

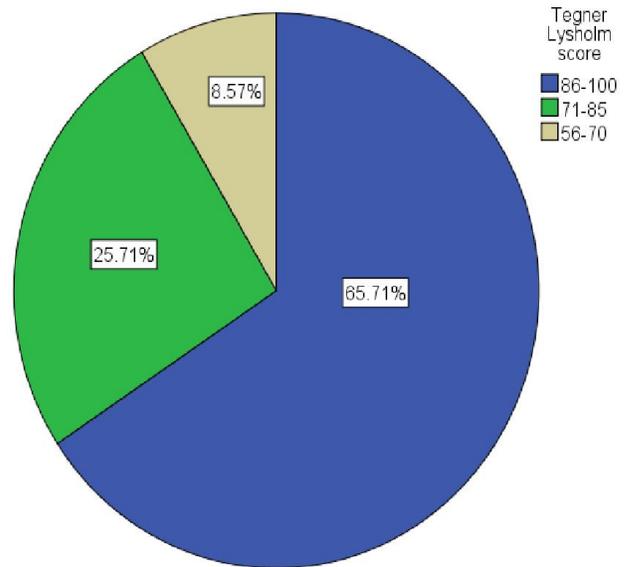


Figure 3: Percentage distribution of Tegner Lysholm score

Tegner Lysholm score between genders was insignificant (p=0.4) as shown in Table-1.

Table 1: Tegner Lysholm score among genders

	Tegner Lysholm score			Total	P-value
	86-100	71-85	56-70		
	(Excellent)	(Good)	(Fair)		
Male	11	2	1	14	0.4
Female	12	7	2	21	
Total	23	9	3	35	

Discussion

Retrograde femoral nailing is increasingly being employed for the treatment of extra-articular distal femoral fractures in major trauma centres around the world.¹⁴ In our study, statistics of gender distribution for patients with distal femoral fractures were in accordance with the study done by Elsoe et al. in which 66.6% patients were females while 33.4% were males. These figures supported the world-wide incidence of distal femoral fractures among genders.¹⁶ Male to female ratio in our study was 1:1.5 which was similar to a study done by Agunda et al. in Kenya, where the ratio was 1:1.6.¹⁷ Majority of the patients (57.1%) in our study had involvement of right distal femur.

In a study done by Streubel et al., 53 (58%) patients had a fracture of the right distal femur while 39 (42%) had left femoral involvement.¹⁸ So both studies reinforced each other. Mean age of patients in our study was 51.4±11.4 years. Most common age group in males was 41-50 years while in females 61 years and above. Pietu et al. in a study conducted in France also had a similar mean age of 63.5 years.¹⁹ One very important finding among age distribution in our patients was their bi-modal pattern. Male patients were mostly young (mean age = 40.5±7.5 years) while females comparatively belonged to the older age group (mean age = 58.7±6.7 years). This bi-modal distribution pattern has been shown in various studies in the literature. The study conducted by Elsoe et al. had male patients with an average age of 44.0 years and females with 71.6 years as their mean age.¹⁶ In another study undertaken by Chang et al. also illustrated this age distribution pattern.²⁰ This older age prevalence in female patients can be attributed to

the post-menopausal osteoporosis-related to hormonal changes.

Female patients in our study had comparatively more BMI (23.4±2.9 kg/m²) than males (21.6±2.3 kg/m²). Similar results were also shown by Streubel et al. where the mean BMI in non-periprosthetic distal femoral fractures was 27.7±8.0 kg/m².¹⁸ Retrograde femoral nailing showed outstanding results at 6-months post-operatively in our study. Tegner Lysholm score was between 86-100, 71-85 and 56-70 in 65.7%, 25.7% and 8.6% cases, respectively. These statistics were supported by a study conducted by Sarraj et al. who showed excellent-good results in 72% of patients.²¹ In another study undertaken by Kulloli et al. in India, he had excellent outcome in 84% cases using Tegner Lysholm scoring system for retrograde intramedullary femoral nailing.²²

There were certain limitations in our study. Firstly, it had a smaller sample size. Secondly, Tegner Lysholm scale was only employed to assess the functional outcome of retrograde nailing. Thirdly, it had a follow-up of 6 months only. In future, studies with longer follow-up and using other post-operative functional parameters can be done to further check the outcome of retrograde femoral nailing. The biggest scientific implication of our study will be on Orthopaedic surgeons enabling them to go for retrograde femoral nailing in a patient with extra-articular distal femoral fractures.

Conclusion

Retrograde femoral nailing has excellent functional outcome in patients with extra-articular distal femoral fractures.

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