

A CLINICAL STUDY OF EVALUATION OF THE FUNCTIONAL OUTCOME OF DISTAL END FEMUR FRACTURE MANAGEMENT, BIHAR, INDIA.

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ABSTRACT

Background

Nearly six percent of all femur fractures are distal fractures. The purpose of this study was to assess how treating distal femur fractures affected functional results.

Materials and Methods

64 patients of both sexes who had distal femur fractures were analyzed. The study noted details including the fracture subtype, affected side, and etiology of damage. Utilizing the Anugrah Narayan Magadh Medical College, Gaya for Special Surgery scoring system, functional results were evaluated.

Results

Of the 64 patients, 30 were men and 34 were women. Thirty incidents of injuries were caused by traffic accidents, 17 by falls, and 19 by other reasons. 13 individuals had fractures to their right side, and 27 to their left. In 40 cases, treatment involved open reduction with locking compression plates; in the other 18 cases, closed reduction was used. The average knee score was 88.2, and the range of knee flexion was 101 degrees. In 54 cases, the functional outcomes were excellent, in 21 cases good, and in 4 cases fair. Two cases of limb length discrepancy, one case of malunion, two cases of shortening, and two cases of knee stiffness were among the complications.

Conclusion

Both closed reduction and open reduction with securing compression plates were employed as therapeutic modalities for the management of distal femur fractures. The majority of cases had very good functional results.

Recommendations

Based on the study's findings, it is recommended that for the management of distal femur fractures, healthcare professionals consider both closed reduction and open reduction with securing compression plates as viable treatment modalities. These approaches have shown positive functional outcomes, with the majority of cases achieving excellent results in terms of knee function and mobility.

Keywords: Locking Compression Plate, Femur Fractures, Function Outcome

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INTRODUCTION

Fractures involving the distal region of the femur are responsible for about 6 percent of the total cases of femur fractures. The presence of a bimodal age distribution has been observed [1]. The peak incidence of this condition is observed in patients who are below the age of 40, with a higher prevalence among males. This demographic is typically associated with cases involving high-energy trauma. The incidence of osteoporotic fractures in patients over the age of 50, particularly females, is observed to increase. These fractures are often associated with low-

energy trauma [2]. The predominant causative factor for injury often entails the imposition of an axial load upon the femur, whereas rotational forces, although less prevalent, also contribute to the incidence of distal femoral fractures. Distal femur fractures represent complex injuries involving the distal 15 cm of the femur, which encompasses both the supracondylar and intercondylar regions. The management of these fractures presents a formidable challenge, considering their intrinsic tendency for substantial morbidity [3]. Throughout history, the effective management of supracondylar and intercondylar fractures of

the distal femur has presented notable difficulties [4]. The aforementioned fractures frequently exhibit instability and comminution, and have a propensity to manifest in elderly individuals or those with multiple injuries. In the context of femoral fractures, it has been noted that around 31 percent of such fractures manifest in the distal region, excluding those specifically involving the hip. Given the close proximity of these fractures to the knee joint, the achievement of full restoration of knee motion and functionality may present a considerable challenge [5]. Open reduction and internal fixation (ORIF) employing plate and screws is now regarded as a widely accepted and established modality for the management of diverse fracture types. Nevertheless, the management of comminuted, intra-articular distal femoral fractures remains a complex and challenging situation for orthopedic surgeons. A considerable proportion of these fractures are ascribed to high-energy trauma, resulting in the manifestation of profound soft tissue damage and fragmentation of the articular and metaphyseal regions [6]. The present study was conducted to assess the functional outcome of distal end femur fracture management.

MATERIALS & METHODS

Study design

A clinical study.

Study setting

The study was conducted at Department of Orthopaedic, Anugrah Narayan Magadh Medical College, Gaya, Bihar, India between July 2019 and September 2021.

Participants

A total of 64 patients were included in the study.

Study size

Patients with distal end femoral fractures of both genders were included in this study. Thorough clinical examinations were carried out, and information was recorded regarding the fracture subtype, affected side, and mechanism of injury. Utilizing the Anugrah Narayan Magadh Medical College, Gaya for Special Surgery grading system, functional results were assessed.

Bias

There was a chance that bias would arise when the study first started, but we avoided it by giving all participants the identical information and hiding the group allocation from the nurses who collected the data.

Variables

Patient data was well documented, including name, age, and gender.

Statistical analysis

After the completion of data collection, a comprehensive statistical analysis was conducted, employing a significance level of $p < 0.05$.

Ethical considerations

Written consent was given by each individual to participate in the study.

RESULTS

30 male and 34 female patients made up the study's 64 total participants. Road traffic accidents (RTAs) accounted for 30 cases of the most common manner of injury, followed by falls (17 cases) and other causes (19 cases). Regarding laterality, there were 27 patients with left side fractures and 31 with right side fractures. There was variation in the treatment modalities used; 40 instances underwent open reduction with a locking compression plate, and 18 cases underwent closed reduction.

Table 1: Participants demographics

Variables	Percentage
Age in years	40.7 ± 1.23
Gender	30:34
AO/OTA Classification	
A2	1
A3	3
C1	1
C2	10
C3	19
Primary procedure	
Primary plating	26
External fixator	8
Bone grafting	
As staged procedure with plating after external fixator removal	8
Non-union after primary plating	8
Revision fixation	1

The patients' average knee score was 88.2, indicating satisfactory functional outcomes, and their range of flexion averaged an astonishing 101 degrees. In particular, 21 patients had a good outcome, 4 showed a fair outcome, and 54 patients had an exceptional functional outcome.

Notwithstanding these encouraging outcomes, certain issues were noted. During their recuperation, two patients

exhibited differences in limb length, one patient had malunion, two patients had shortening, and two more patients had knee stiffness.

Table 2: Evaluation of the parameters

Parameters	Variables	Number
Mode of injury	RTA	30
	Fall	17
	Others	19
Laterality	Left	27
	Right	31
Management	Open treated with locking compression plate	40
	Closed reduction	18
Range of knee flexion		101 degrees
average knee score		88.2

DISCUSSION

The purpose of the study was to assess how treating distal femur fractures affects function. 30 male and 34 female patients made up our total of 64. Following the methodology developed by Kishore *et al.* [7], the patients were thoroughly monitored, recording their development on a regular basis. Using the Anugrah Narayan Magadh Medical College, Gaya for Special Surgery functional score, patients' average knee flexion range was approximately 101 degree, and their average knee score was 88.88. The study findings did not reveal any statistically significant associations with age or knee score. However, notable statistical significance was observed in the differences in knee range of motion between closed and open fractures. Given the significance of injury morphology over implant selection, it has been demonstrated that intra-articular fractures elicit greater

levels of discomfort and functional limitations. Muscle strain from distal femur fractures makes them difficult to treat and frequently causes instability [8, 9]. Particularly when brought on by high-energy trauma that results in significant soft tissue damage and bone fragmentation [10], these fractures can result in long-term impairment and possible infections [11]. In these circumstances, there is a considerable risk of infection, non-union, and malunion. In older patients, previous joint arthroplasty may complicate the course of treatment [12].

In terms of how the patients were injured, 30 patients had been in traffic accidents (RTA), 17 had fallen, and 19 had other reasons. Of them, 27 suffered left side fractures and 31 right side fractures. In 40 cases, the treatment was open reduction with a locking compression plate; in the other 18 cases, it was closed reduction. Patients' average knee score

was 88.2, and they demonstrated an amazing flexion range of 101 degrees.

A distal femoral locking compression plate was used to treat 20 cases of distal femoral fractures in Konuganti *et al.*'s study [13]. Of the 20 patients, 18 had closed injuries, and the majority were in their third decade of life. Type A2 Muller's fracture accounted for 35% of all fractures. Patients were able to bend their knees an average of 109 degree, and Neer's functional score gave them a mean score of 81.75 points.

In this study, it was found that 54 individuals had great functional outcomes, 21 had acceptable outcomes, and 4 had fair outcomes. Leg length disparity occurred in two cases, malunion occurred in one, shortening occurred in two, and knee stiffness occurred in two.

The average follow-up length in Schutz *et al.*'s study [14] was 13.7 months, and fractures affecting the supracondylar femur and distal femoral shaft were seen. A cohort comprising 96 patients, encompassing a total of 99 fractures, was available for comprehensive follow-up, exhibiting an impressive follow-up rate of 93%. It is noteworthy to mention that eight patients unfortunately succumbed during the trial due to unrelated causes. During the observation period, fractures had healed in 90% of instances. Because of the new implant's inexperience or the severity of the first trauma, some individuals needed revision surgeries. Overall, the study showed that this method of treatment was very effective and safe for treating different kinds of distal femur fractures, including periprosthetic fractures, and that it frequently avoided the need for initial cancellous bone grafting.

Generalizability

The generalizability of the study's findings should be approached cautiously. Conducted at Anugrah Narayan Magadh Medical College in Bihar, India, the results may not directly apply to different geographical regions or demographic groups due to variations in healthcare infrastructure, patient demographics, and fracture patterns. The specific treatment methods employed, including open reduction with locking compression plates and closed reduction, may not be universally applicable, as their success can depend on the availability of resources and surgical expertise in different healthcare settings. Cultural, lifestyle factors, and clinical practices, such as post-operative care and rehabilitation protocols, may differ, affecting functional outcomes. Additionally, the study's patient population consisted of 30 males and 34 females, making it important to consider how these results might differ in populations with varying age distributions, comorbidities, and fracture characteristics. The choice of a particular functional scoring system and methodology, as well as the study's focus on trauma mechanisms prevalent in the region (e.g., traffic accidents), further limit the generalizability of the findings. Therefore, applying these

results to other settings should be done with careful consideration of the specific context and patient population. Further research in diverse healthcare environments is needed to enhance the applicability of these findings.

CONCLUSION

The investigation conducted by the authors unveiled that fractures transpiring at the distal aspect of the femur were efficaciously managed through a synergistic approach involving open reduction employing a locking compression plate and close reduction methodologies. The functional outcome was determined to be excellent in the majority of cases.

Limitations

The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendations

Based on the study's findings, it is recommended that for the management of distal femur fractures, healthcare professionals consider both closed reduction and open reduction with securing compression plates as viable treatment modalities. These approaches have shown positive functional outcomes, with the majority of cases achieving excellent results in terms of knee function and mobility.

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List of abbreviations

ORIF- Open reduction and internal fixation
RTAs- Road traffic accidents

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Conflict of interest

The authors have no competing interests to declare.

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