

COMPLEX DISTAL FEMUR FRACTURE FIXED WITH NAIL/PLATE COMBINATION – A SERIES OF 20 CASES

Orthopaedics

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ABSTRACT

Comminuted distal femur fractures are complex and challenging injuries to treat. Various treatment modality have been used for treating such fractures. Largely a single implant constructs are faced with various complications including Varus collapse, Knee stiffness, delayed weight bearing and non-union. Lately, double implant construct Nail/plate, dual plate construct has shown advantage with respect to above mentioned complications. Moreover, Combined nail with plate fixation has advantages over single lateral plate as patients were allowed full weight bearing post operatively with early union rate and early discharge from hospital. In this review, we present our findings for double fixation construct of distal femur fractures using retrograde intramedullary nail and locking lateral distal femur plate.

KEYWORDS

distal femoral fracture; double fixation; double plating; nail-and-plate construct

INTRODUCTION

Fracture of distal femur accounts for 3-6 % of all femur fracture [1][2] with around 10% being comminuted [3]. High-energy injuries often cause a short distal segment, significant bone defects, fractures extending into the articular surface, medial column comminution. In elderly patients, osteoporosis often complicates the fracture causing insufficient implant anchorage and poor purchase of screws thus obstructing stability [4], therefore resulting in delayed weight bearing. Restricting weight-bearing post operatively may worsen patients' quality of life, lengthen recovery time, and raise the risk of problems [5].

The challenge for the surgeons remains in the balance of providing stable fixation to support physiological loading until union while allowing necessary micromotion for callus formation. In certain complex clinical situations, a single lateral LCP or retrograde Intramedullary nailing may not achieve this balance. These have encouraged the development of double fixation constructs. Practice of using Double-construct fixation for distal femoral fractures [6] has gained popularity recently, especially in complex fracture configuration. The goal was to decrease the failure rate by providing stable healing microenvironment that allows early or immediate range of motion and weight-bearing. In this review, we present the result of double fixation construct using nail and plate for complex distal femoral fractures, for example, high-energy open fractures in a younger population, osteoporotic fractures of the elderly, or periprosthetic fractures.

MATERIALS AND METHODS

The analysis was conducted on 20 patients of all ages (mean age 60 years) that underwent a combined nail/plate fixation for distal femur fractures in KD Medical College, Mathura between July 2021 and June 20223 with a minimum radiographic follow-up of 1 year. Ethical clearance for this study has been obtained from the Institute's Ethical Committee.

Inclusion Criteria

The study included:

- individuals who were between 40-80 years old
- individuals who had complex distal femur fractures

Exclusion Criteria

The study excluded:

- individuals who had grade 3 A/B/C compound fractures
- associated ipsilateral limb injuries hindering post-operative weight-bearing
- previously operated case of distal femur fracture

The following variables were recorded for every case: post operative complications, time taken for fracture union, postoperatively Knee range of motion.

Post Operative Protocol

Static and Dynamic Knee Quadriceps exercises, Knee range of motion

exercises were started immediately from 1st POD followed by toe touch weight bearing with walker support from day 2 of surgery. Full weight bearing with walker support started from 2 weeks. Follow up examinations were done at 3 months, 6 months and 1 year after the operation.

RESULTS

In our study, 20 cases were included that presented to our institution and fulfilling all inclusion criteria. All patients were treated using same implant of combined retrograde Femur Nail and Lateral distal Femur locking plate.

Age

The mean age group in this study was 60.

Table 1 : Age Distribution

AGE IN YEARS	FREQUENCY	PERCENTAGE
40-49	1	5%
50-59	3	15%
60-69	8	40%
70-79	7	35%
80	1	5%
TOTAL	20	100%

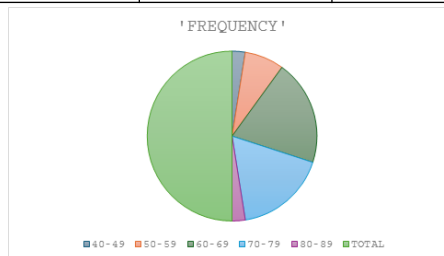


Figure 1 : Age Distribution

Gender

There were 12 (60%) males and 8 (40%) females in the study.

Side Of Injury

There were 14 right femur (70%) and 6 left femur (30%) surgeries in the study.

Type Of Fracture

Out of total cases 15 were having closed distal femur fracture, 4 patients had type 1 open distal femoral fracture and remaining 1 case was type 2 open.

Table 2 : Type of Fracture

TYPE OF FRACTURE	FREQUENCY	PERCENTAGE
CLOSED	15	75%

GUSTILO ANDERSON TYPE 1	04	20%
GUSTILO ANDERSON TYPE 2	01	05%
TOTAL	20	100%

Fracture Union

The mean time to fracture union was 20 weeks (range from 16 to 24 weeks), and all cases healed uneventfully.

Table 3 : Time To Fracture Union

TIMING OF FRACTURE UNION	FREQUENCY	PERCENTAGE
12 – 16 weeks	1	5%
16 – 20 weeks	6	30%
20 – 24 weeks	12	60%
9 months	1	5%
TOTAL	20	100%

Radiologically fracture union was confirmed by the presence of radiographic callus formation in $\frac{3}{4}$ th of the cortices and clinically by patients being able to mobilize with no pain and assistance during the follow-up assessment.

Complications

There were no major complication, 1 case of superficial wound infection, 5 cases of post operative Knee stiffness and 1 case of delayed union.

One case (Gustilo Anderson type 2) had superficial wound infection, delayed union and post operatively knee ROM was 5-70 degrees. No limb length discrepancy of more than 1 cm was noted.

Table 4 : Complications

COMPLICATIONS	FREQUENCY
SUPERFICIAL WOUND INFECTION	1
KNEE STIFFNESS (Flexion <110°)	5
DELAYED UNION	1
LIMB LENGTH DISCREPANCY	Nil

For knee stiffness CPM was initiated.

Superficial wound infection treated successfully with a course of oral antibiotics and subsequent dressing for one week, with complete resolution of the infection and no further surgical intervention.

DISCUSSION

Distal femur fractures can be a major problem, even for the most experienced trauma surgeons, and could offer a considerable challenge to stable fixation. Depending on the fracture pattern, patient characteristics, and surgeon preference, distal femur fractures are typically treated with either a distal lateral femur plate or a retrograde Intramedullary nailing. Numerous studies have provided a clear description of hardware failure with single implant fixation; the most well-defined mechanism of failure is the eccentric load causing varus collapse [7]. Many surgical techniques developed focuses on double fixation construct allowing early immobilization in order to overcome this common complication.

The nail/plate construct has been described by many authors with excellent outcomes[9,10]. In the study of Kanabur et al. [10], all patients who received a nail/plate fixation had radiographic union and were able to bear weight independently or with an assistive device at a mean follow up of 20.6 months.

In the study by Passias et al. [8], the combined nail plate construct group achieved excellent radiographic union rates, in our study the radiographic union was 100% vs. 69% of the union rate of the single construct fixation group (retrograde Intramedullary nailing or LP) in the study by Passias et al.

In our study we found that the nail/plate construct in the treatment of complex distal femur fracture offers better stability, allows for early weight bearing and reduces risk of non-union and revision surgeries. There were some limitations in the above study. It was retrospective non-randomized study focusing only on single surgical technique.

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Conflict Of Interest

The author(s) declare that there are no conflicts of interest related to this research. There are no financial or personal relationships that could have influenced the results reported in our study.

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