

## A study to evaluate and compare the results of different modalities of operative treatment of distal femoral fracture

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**Aim:** of the study was to evaluate and compare the results of different modalities of operative management of distal femoral fractures. **Material and Method:** The present study was conducted on 48 patients having fractures of the distal femur (involving distal 15cm of the femur). The cases were picked up from the patients treated at two tertiary care hospitals by open reduction and internal fixation from July 2014 to July 2018. Both anatomical and functional results were analyzed and graded. **Results:** Age of the patients operated upon ranged from 16-75 years (Mean age 41.6years). Male-dominated in our series, comprising 72.91% (35 out of 48 cases). All patients in our series had unilateral involvement of distal femoral fractures. The right side was however involved more i.e. 29 out of 48 (60.4%). The most common mode of the accident in our series was automobile accident (91.67%). 42 out of 48 were closed fractures (87.5%), whereas the remaining 6 patients (12.5%) had open grade I type of fracture. Associated injuries were observed in 13 out of 48 cases in our series (27%). In most of the patients, the implant used was either a dynamic condylar screw or a distal femur plate. 41 out of 48 patients (85.42%) were discharged from the hospital within 7 days. **Conclusion:** For Distal femoral fractures early open reduction, rigid fixation allows accurate anatomical alignment, reconstruction of articular surfaces joint congruity and it offers opportunities for early post-operative knee mobilization and prevents frequent problems of limitation of knee movements, nonunion and osteoarthritis.

**Keywords:** Condylar screw, Distal femoral fracture, Osteo-arthritis

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## Introduction

Distal femoral fractures constitute about 10- 15% of all fractures of the femur [1]. The optimum treatment for the fractures of the distal femur in adults continues to be debated until today. Till recently it was being managed as an extension of femoral shaft fracture treated with skeletal traction supplemented by manual manipulation of fracture fragments. Stewart MJ et al [2] advocated cast bracing for the management of distal femoral fractures. Relatively recent advances have improved the overall results of the surgical treatment of these fractures. These advancements include improved surgical instrumentation, rigid fixation, improved rehabilitation without postoperative plaster cast immobilization, and immediate postoperative knee movements Connolly J. F, et. Al [3] and Mooney V et al [4].

A new intra-medullary fixation device having a specially shaped rod and a compression screw to conform to the medullary canal of the condyle and distal femoral shaft was advocated by Zickel R E et al [5] This resulted in prevention of late osteoarthritis and elimination of fracture disease. This changing pattern of fracture treatment for a supracondylar fracture of femur prompted us to carry out this study, so as to evaluate the efficacy of various implants and to compare the results of operative treatment of such fractures.

## Material and Methods

The present study was conducted on 48 patients having fractures of the distal femur (involving distal 15cm of the femur). The cases were picked up from the patients treated at two tertiary care hospitals by open reduction and internal fixation from July 2014 to July 2018. The patients were examined thoroughly to rule out any systemic disease. Routine investigations like Hb, TLC, DLC, PT, APTT, Blood Sugar, and urine examinations were done in all cases. HIV and HBsAgX-ray chest, ECG, Blood Urea, Serum Creatinine, Serum Electrolytes, etc. were done wherever indicated.

**Operative procedure:** The fractures were exposed through appropriate incision and choice of the implant was done according to the requirement in a particular case depending upon types of fractures. The bone grafts were used in cases where indicated, the wound was closed over the negative suction drain in all cases. For the purpose of analysis, the

- Fractures were divided into three types as follows: -
01. Type I - Simple Fractures
  02. Type II — Communion but no joint involvement
  03. Type III — Involvement of articular surface

## Results

Results both anatomical and functional were analyzed and graded according to criteria laid by Schatzker and Lambert.

**Table-1: Distribution of Age**

Age in years	No of cases
< 20	3
21-30	7
31-40	15
41-50	14
51-60	5
61-70	3
Above 70	1
Total	48

The most commonly affected age group was 31-40 years. The next common age group was 41-50 years. The youngest patient was 16 years of age. The eldest one was 75 years of age. The average age of patients in our series was 40.83 years.

**Table-2: Demographic profile: gender distribution**

Sex	Number of patients	Percentage
Male	35	72.92
Female	13	27.08
Total	48	100

35 patients were male and 13 were females.

**Table-3: Side involved**

Side involved	No. of cases	Percentage
Right	29	60.42
Left	19	39.58
Total	48	100

29 patients had right-sided involvement whereas 19 patients had left-sided involvement.

**Table-4: Mode of injury**

Mode of injury	No of cases	Percentage
Accident in moving vehicle	44	91.67
Hit by moving vehicle	2	4.16
Fall from height	1	2.083
Fall afterslip on ground	1	2.083
Total	48	100

Most of the patients were injured while traveling in a moving vehicle either as a passenger or driver. A moving vehicle hit 2 patients while they were walking on the road. One patient sustained the injury following fall after slipping on the ground and one patient sustained an injury from fall from height.

**Table-5: Type of fracture**

Type of fracture	No of cases	Percentage
Type 1 simple	12	25
Type 2 comminuted	15	31.25
Type 3 intercondylar	21	43.75

For the purpose of analysis, the fractures were classified according to Schatzker and Lambert's classification.

**Table-6: Associated injuries observed**

Associated injury	No of cases
Fracture shaft femur	4
Sub trochanteric fracture	3
Fracture patella	3
Fracture of both bone leg	1
Intertrochanteric fracture	1
Fracture tibial plateau	1
Fracture clavicle	1
Fracture scapula	1
Fracture ribs	1
Fracture distal radius	1
Lisfranc fracture-dislocation	1

Associated injuries were found in 13 patients.

**Table-7: Types of implants used**

Implant	No of patients	Percentage
Dynamic condylar screw(DCS)	20	41.67
Retrograde intramedullary nail	10	20.83
Distal femur plate(LC-DCP)	18	37.5

**Table-8: Duration of Hospital stay**

Period of hospitalization	No of patients	Percentage
4-7days	41	85.42
8days-2weeks	7	14.58

Most of the patients were discharged from the hospital within one week.

**Table-9: Functional results**

Results	No of Cases	Percentage
Excellent	11	22.92
Good	12	25
Fair	11	22.92
Poor	14	29.17

## Discussion

Intra-articular T- shaped fractures is an enigma due to their uncertain outcomes. The Conservative approach to these fractures still leads to a lot of complications such as joint stiffness or limitation of movements, residual deformity, uneven weight-bearing, and irregular articular surface, leading to pain and subsequent osteoarthritis. In order to prevent these complications and to achieve alignment of fracture and stable reconstruction of the joint surface, especially in intraarticular fractures the operative method is the treatment of choice. The most commonly affected age group in this series was 31-50 years. Age of the patients operated upon ranged from 16-75 years (Mean age 41.6 years). Siliski J M et al [6] in their series of 60 cases have reported the age range from 15-82 years with an average of 47.2 years. Yang R S et al [7] in their series of 93 patients have reported the age range from 15 to 80 years with a mean of 46.9 years. Male dominated in our series, comprising 72.91% (35 out of 48 cases). The obvious reason for this is that in our society males are more liable to trauma as they are engaged more in outdoor activity. Yang R S et al [7] have also reported male predominance in their series of 93 patients (71 patients male and 22 females). All patients in our series had unilateral involvement of distal femoral fractures. The right side was however involved more i.e. 29 out of 48 (60.4%). The most common mode of an accident in our series was an automobile accident (91.67%). The next common mode of injury was a pedestrian hit by a moving vehicle (4.16%). Yang RS et al [7] reported the incidence of traffic accidents in 72 out of 92 patients in their series. Similar observations were reported by Olerud S [8], Siliski J M et al [6]. This incidence is likely to decrease if the traffic rules are followed strictly. 42 out of 48 were closed fractures (87.5%), whereas remaining 6 patients (12.5%) had open grade I type of fracture. 47 fractures were caused by moderate to severe trauma, whereas only one fracture in an old patient was caused by mild trauma by slipping on the ground. This is obvious, as most of the patients had suffered an injury because of an automobile accident where trauma was moderate to severe. In our series 44 out of 48 patients (91.67%) reported to the hospital within 24 hours of injury. 34 patients were operated within 48 hours of injury. With the patients reporting earlier, definitive treatment can be undertaken early so that post-operative mobilization can be started 51 early to prevent

Various complications associated with this complex fracture. 36 out of 48 patients in our series were having either comminuted or inter-condylar T-shaped fractures whereas only 12 patients had a simple supracondylar fracture. High incidence of comminuted and T-shaped fractures could be attributed to increased severity of trauma seen in vehicular accidents. Schatzker J et al [9] (1974) have reported 47 patients out of 55 in their series as having comminuted supracondylar and intercondylar fractures. Similar observations have also been reported by Halpenny J et al [10], Yang RS et al [7].

Associated injuries were observed in 13 out of 48 cases in our series (27%). These are obviously due to high-velocity trauma caused by automobile accidents. The incidence of associated trauma reported in the literature varies from 23%-72%. Giles JB et al [11] and Siliski JM et al [6] have reported the incidence of associated injuries to be 23% and 59% respectively in their series. 41 out of 48 patients (85.42%) were discharged from the hospital within 7 days. The remaining 7 patients were discharged within 8-14 days. Earlier reports by various workers mentioned the hospital stay ranging from 20-33 days. Cave E F et al [12] Chiron HS et al [13]. However, with improved facilities for rigid fixation and accurate reduction, the hospital stay can be shortened to a great extent, as has been the case in the present study. In most of the patients, the implant used was either a dynamic condylar screw or a distal femur plate or retrograde nailing for comminuted fractures whenever indicated. In 42 patients full weight-bearing was permitted between 12-24 weeks after the operation (average 19.6 weeks). In one patient full weight-bearing had to be delayed up to 28 weeks because of mal-union and implant failure. In the remaining 5 patients, weight-bearing could not be allowed following primary operation because of infection in 3 patients and implant failure in the other 2 patients. Muller ME et al [14] and Drennan et al [15] have reported full weight-bearing between 8- 14 weeks. 11 patients had excellent results. The results were graded as good in 12 patients and in 11 patients, the result was graded as fair. 14 out of 48 patients in this series were graded as poor. EJ Yeap et al in a retrospective review of 11 patients treated for type A and C distal femoral fracture with distal femoral locking compression plate reported almost 80% good results in terms of union and function [16]. The result of the study by Lauri Handolin et al also suggested that retrograde nailing may be used

Successfully in selected cases of periprosthetic fractures [17]. R. Pascarella et al (2014) in an observational study of 89 patients with distal femur patients treated with polyaxial locking plate reported a mean union time of 16.3 weeks. This system offers clinical and radiological outcomes similar to those treated with a fixed trajectory plate but with greater fixation versatility [18]. A little delay in full weight-bearing in our series could possibly be due to the fact that many patients in this series were having Inter-condylar or T- shaped defects.

## Conclusion

For Distal femoral fractures early open reduction, rigid fixation allows accurate anatomical alignment, reconstruction of articular surfaces joint congruity and it offers opportunities for early post-operative knee mobilization and prevents frequent problems of limitation of knee movements, nonunion and osteoarthritis.

## What does the study add to the existing knowledge

It is technically a demanding procedure. Intra-articular fractures (particularly comminuted ones) have comparatively a poorer end results due to postoperative limitation of knee motion even in the best hands

## Author's contribution

**Dr. Manav Moda:** Concept, study design

**Dr. Sachin Samaiya:** Manuscript preparation

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