

## Research Article

# Functional outcome of ORIF of distal femur fracture (AO TYPE B) with intra-articular extension

Shiblee S. Siddiqui\*, Johnny Bharat Joshi, Ravish Patel and Vishal Dindod

Department of Orthopedics, New civil hospital, Surat, India

### \*Correspondence Info:

Dr. Shiblee S. Siddiqui  
Department of Orthopedics,  
New civil hospital, Surat, India  
E-mail: [drjohn.bj13@gmail.com](mailto:drjohn.bj13@gmail.com)

### Abstract

**Background:** Distal femur fractures with intra-articular extension (AO TYPE B) are complex injuries which have been treated by different methods. The authors studied the functional outcome of management of distal femur fractures with the published literature.

**Aim and objectives:** The purpose of this study is to evaluate the outcome of operated cases of distal femur fracture with intra-articular (AO TYPE B) with open reduction and internal fixation and also to study union rates, full weight bearing of it by fixation.

**Study design:** Retrospective study

**Materials and methods:** Distal femur fractures with intra-articular extension (AO TYPE B) treated with open reduction and internal fixation during the period Jan 2011-Dec 2012 at Govt. Medical College, Surat formed the study population. They were evaluated to assess their clinical and functional results using Neer's Scoring system and compared with the available literature. The results were analysed using different parameters; male vs. female, age distribution, functional outcomes and complications etc.

**Results:** The results were excellent in 70%, good in 19%, fair in 11% and poor in 0%. Results were assessed and found to be excellent in majority of cases with mean knee flexion being 102.8 degrees, mean fracture union time of 15.5 weeks, with mean full weight bearing duration of 12.7 weeks .complications being knee stiffness (0),delayed union (01),infection (01),shortening(01)knee pain (04)

**Conclusion:** Surgery in the form of ORIF is recommended for Distal femur fractures with intra-articular extension (AO TYPE B) for good outcome and early mobilization with minimum preventable complications.

**Keywords:** Distal femur fractures with intra-articular extension, ORIF (Open reduction and internal fixation), Neer's scoring system, AO TYPE B

## 1. Introduction

"Few injuries present more difficult problems than those associated with supracondylar and intercondylar fractures of femur" - Sir Reginald Watson Jones<sup>1</sup>.

The above statement by one of the great orthopaedician aptly describes the complexity in treating these fractures. Severe soft tissue damage, comminution, intraarticular extension, injury to the Quadriceps and extra articular adhesions are some of the challenges faced by the surgeon.

In the early part of 20<sup>th</sup> century closed reduction as described by Watson Jones and John Charnley<sup>1</sup> led to stiffness, angular deformities or shortening and needed prolonged confinement to the bed. This prompted the present generation of Orthopaedicians to indulge in a more aggressive treatment i.e. open reduction and internal fixation which led to complications like infection, non-union and inadequate fixation by an inexperienced surgeon.

### 1.1 Aims and objectives

The aim of the study was to evaluate the functional outcomes of distal femur fractures with intra-articular extension (AO TYPE B) in Government Medical College, Surat from Jan 2011-Dec 2012

## 2. Materials and methods

The present study was conducted to study the outcomes of management of distal femur fracture with inter-articular extension (AO TYPE B) in department of orthopaedics, Government Medical College, Surat on patients operated during the period of two year from January 2011 to December 2012.

**2.1 Study design:** Retrospective study

### 2.2 Source of data

Patients operated for Distal femur fractures with intra-articular extension (AO TYPE B) in the Department of Orthopaedics, New civil hospital Surat during the period of two year from January 2011 to December 2012.

### 2.3 Sample size

All patients with for Distal femur fractures with intra-articular extension (AO TYPE B) who underwent operative procedure from January 2011 to December 2012 were selected for the study.

### 2.4 Selection criteria

#### Inclusion criteria

- All patients with age above 18 years having supracondylar and intercondylar fractures of femur(AO TYPE B) with an indication for surgical management.

#### Exclusion criteria

- Pathological fractures
- Polytrauma patients
- Patients treated conservatively
- Patients who were bed ridden or non-ambulatory
- Patients with severe life threatening medical problems

## 2.4 Procedure

The study was approved by Ethical and Research committee of Government medical college, Surat. After finding suitability of inclusion and exclusion criteria patients were selected for study and briefed about the nature of the study, the interventions used and written informed consent was obtained. The consented patients were enrolled into present study. Further descriptive data of the participant's like name, age, sex, detailed history were obtained by interviewing the participants and clinical examination and necessary investigations were recorded.

Upon arrival of the patient, primary emergency management was carried out. A thorough examination was done to rule out life threatening injuries. Once the patient was hemodynamically stable; the fractured extremity was immobilised in a Thomas's Splint and later in the emergency operation theatre upper tibial traction was applied and traction was given over a Bohler's frame in the ward.

In the present series there were 13 open fractures. All were treated by parenteral Cephalosporins from day one to a week thereafter or till the sutures was removed. Gentamycin was given for 5 days.

All procedures were done under spinal anesthesia. Implants used were Dynamic Condylar Screw (DCS), Locking Compression Plate (LCP) or Condylar Buttress Plate (CBP).

Gentamycin was injected into the surgical site after fixation. Post operative assessment of knee joint stability was done. Sutures were removed; Physiotherapy was started immediately and all patients were personally followed up. The functional and radiographic results were recorded according to Neer's Criteria and Knee Society Score<sup>2</sup>.

## Assessment of Patient with Neer's scoring system

Functional (70 points) and Anatomical (30 points)

Excellent- more than 85 points

Good- 70 to 85 points

Fair- 55 to 69 points

Poor- less than 55 points

## 3. Observation and results

Out of 16 patients, 13 (81%) were males and 03 (19%) were females.

**Age:** The youngest patient was 18 years old and the oldest 72 years old. The average age was 39.3years.

**Mode of injury:** About 75% patients had sustained road traffic accidents, remaining 25% were due to fall from height or domestic falls. The delay in discharge was due to associated injuries or infection.

The average duration for full weight bearing was 12.7 weeks. Average range of motion of knee was 102.8° with the average time of union was 15.5 weeks. Among 16 patients there were 11(70%) excellent results, 03 had (19%) good results, 2(11%) had fair results and 0 (0%) were classified as poor.

**Table 1: Age Distribution**

Age (years)	Total	
	No.	Percentage (%)
0 – 20	1	6
21 – 40	8	50
41 – 60	5	31
61 – 80	2	13
Total	16	100

**Table 2: Sex distribution**

Sex	No of patients	Percentage
Male	13	81
Female	3	19

**Table 3: Mechanism of injury**

Mechanism of injury	No. of case	Percentage
Road traffic accident	12	75
Fall from height	4	25
Total	16	100

**Table 4: Relationship between sex and cause of fracture**

Sex	Vehicular accident		Fall	
	No.	Percent	No.	Percent
Male	10	63	3	19
Female	2	12	1	6
Total	12	75	4	25

**Table 5: Type of fracture**

Type of fracture	No of fracture	Percentage
Open	4	25
Closed	12	75

**Table 6: Time to union**

Union (weeks)	No. of cases	Percentage
<16	10	63
16-18	4	25
18-20	0	0
20-22	0	0
22-24	2	12

Average time for fracture union was 15.5 weeks (ranging from 16 to 24 weeks). There were 1 delayed unions. There were no non unions. There was no mal union. None of the patients required bone grafting.

**Table 7: Time at which full weight bearing achieved**

Achieved time (weeks)	No. of cases	Percentage
8-10	2	12
>10-12	6	38
>12-14	2	12
>14-16	4	25
>16-18	0	0
>18-22	1	7
>22	1	7

Average time of full weight bearing was achieved by 12.7 weeks.

**Table 8: Knee flexion**

Knee Flexion (Degrees)	No. of cases	Percentage
<90	5	31
91-109	3	19
>110	8	50

Average flexion in this study was 102.8 degree.

**Table 9: Functional rating as per Neer's rating score**

Rating	No. of cases	Percentage
Excellent >85 points	11	70
Good 70-84 points	3	19
Fair 50-69 points	2	11
Poor <50 points	0	0

Long term final results were rated using Neer's rating system, which allots points for pain, function, working ability, joint movements, gross and radiological appearance. Neer's score was assigned for each patient.

#### 4. Complications

The complications we encountered include anterior knee pain in 04 patients, shortening in 01 patient. There were 01 cases infection which subsided after debridement and antibiotics. There was 01 delayed union. There were no cases of implant failures.

#### 5. Discussion

The prognostic factors for condylar fracture include age, intra articular involvement, method of treatment, timing of joint mobilisation etc. Comparison of studies is often difficult because of difference in the classification schemes and the use of different methods of treatment<sup>2,3</sup>. Several articles have been published documenting superior functional results using internal fixation<sup>4,5,6</sup>. Rigid fixation has also enabled earlier knee motion and weight bearing, which help prevent some of the serious complication attributed to prolonged bed rest and traction<sup>2,7</sup>.

There were 2(11%) fair and 0(0%) poor results in this study which was lower when compared to the study by Siliski et al and Yeap et al which had 20% poor results.<sup>6,8</sup>

##### Major contributing factors were:

- (1) Improper fixation due to complexity of comminution or surgical technique.
- (2) Elderly age group constituted majority, who were less motivated than young people to initiate exercises. Their bones were osteoporotic with very low osteogenic potential.
- (3) Delay in surgery was a factor which resulted in bad results.

Schatzker obtained 74% better results<sup>3</sup>. In our study it was 70%. Acceptable knee flexion following treatment ranges from 65° to 117°.5,9 In our study it was 102.8°, which compared favourably with the literature. Hence our study matches with most studies. A study by Siliski<sup>6</sup> et al had post operative infection rate of 6%, while our study it was 6%.<sup>6</sup>

#### 6. Conclusion

Though the series is relatively small and it is retrospective study and period of follow up is small, however it appears that the results presented here indicate the value of stable internal fixation, when anatomical reconstruction of the distal end of femur can be accomplished, thereby reducing the risk of post traumatic arthritis due to incongruence of articular surfaces and early mobilization of the knee joint. It provides predictably reproducible good functional results with low morbidity and good healing rates as well as satisfactory mobility in AO type B distal femoral fractures.

Detail clinical examination and good radiological evaluation including CT scan in selected cases are important.

A possibility of associated injury should always be kept in mind to minimize complication.

Open fracture should be treated in emergency with adequate debridement, anatomical fixation and proper antibiotics.

A good surgical technique and judicious use of antibiotic will prevent infection.

Adherence to technique and AO principle will reduce the occurrence of complication and helps in achieving good results.

Anatomical distal femur locking plate appears to be good surgical options for treatment of Distal femur fracture with intra-articular extension.

A good soft tissue handling and accurate reduction along with stable fixation are key point to good outcome.

Stable fixation and early post-operative physiotherapy is very important for good outcome.

Communion of fracture adversely affects the results.

Unstable and incongruent reduction resulted in poor outcome.

Early open reduction and internal fixation can be done in open uncontaminated fracture.

Open fractures always carry poor outcomes in terms of infection.

#### Acknowledgement

The author did not receive any grants or outside funding for support of the research or preparation of the manuscripts. No funding was received for this work from any of the organizations.

**References**

1. Watson – Jones R. Fractures and joint injuries. 6th ed, BI Churchill Livingstone Pvt. Ltd, New Delhi, 1990
2. Neer CS II, Grantham SA, Shelton ML, Supracondylar fracture of the adult femur. *J Bone Joint Surg* 1967; 49A: 591-613
3. Shatzker J, Lambert DC. Supracondylar fractures of the femur. *Clin Orthop* 1979; 138:77-83.
4. Muller ME, Allgower M, Schneider R, Willenegger H. Manual of Internal fixation. New York, Springer-Verlag 1979.
5. Shelbourne DK, Brueckmann FR, Rushpin fixation of Supracondylar, and intercondylar fractures of the femur. *J Bone Joint Surg* 1982; 64A; 161-169.
6. Siliski JM, Mahring M, Hofer HP. Supracondylar – Intercondylar fractures of the femur. *J Bone Joint Surg* 1989; 71A: 95-104
7. Mooney V, Nickel VL, Harvey JP, Snelson R, Cast braced treatment of fracture of distal part of femur. *JBJS* ;1970;52A;1563-1578
8. Yeap EJ, Deepak AS. Distal Femoral Locking Compression Plate Fixation in Distal Femoral Fractures: Early Results. *Malysian Orthopaedics Journal* 2007; 1(1):12-17.
9. Brown D, D'Arcy W, Internal fixation for supracondylar fractures of the femur in the elderly patient. *J Bone Joint Surg* 1971; 53B: 420-424.