

## Functional Outcome of Close Supracondylar and Intercondylar Fracture Femur Treated by Locking Femoral Plates

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### Abstract:

**Background:** Distal fracture of femur present a huge surgical challenge in orthopedic surgery. These fractures are difficult to treat and operative treatment is usually recommended for favorable outcome. These are associated with high energy trauma (in the youngsters) and osteoporotic bones (in the elderly) and are frequently comminuted and intra-articular. This study was conducted to determine functional outcome of locking plate fixation in our population. **Objective:** To determine functional outcome of close supracondylar and intercondylar fracture femur treated by locking femoral plate at a tertiary care hospital. **Material and Methods:** A total of 64 consecutive patients with supracondylar, intercondylar fracture femur duration less than 6 weeks were taken in this study from department of Orthopaedic Surgery, Nishtar Hospital Multan. All the relevant information was collected and noted in the study proforma and these patients were managed as per hospital protocols and were treated by locking femoral plates. These study cases were followed for their functional outcome such as union of fracture and complications. **Results:** Of these 64 study cases, 24 (37.5%) were male patients while 40 (62.5%) were female patients. Mean age of our study cases was noted to be  $46.80 \pm 8.08$  years. Mean BMI of our study cases was noted to be  $23.08 \pm 1.80$  kg/m<sup>2</sup>. Our study results have indicated that majority of our study cases i.e. 73.4% were normal weight, 11 (17.2%) were overweight and 6 (9.4%) were obese. Mean duration of fracture was  $2.48 \pm 1.33$  weeks. Mean duration of surgery was  $65.86 \pm 12.29$  minutes and mean duration of hospital stay was noted to be  $7.22 \pm 1.33$  days. Union of fracture was noted in 57 (89.1%) of our study cases while DVT was noted in 12 (18.8%) of our study cases. **Conclusion:** There was high frequency of union of fracture observed in our study. Our study results support the use of locking femoral plate fixation in functional outcome of supracondylar and intercondylar fracture of femur as it is safe and reliable. Union of fracture was significantly associated with obesity and type of fracture while DVT was significantly associated with male gender, type of fracture and history of smoking.

**Keywords:** Supracondylar, Intercondylar, locking plate fixation.

### Introduction:

Distal femoral fractures, which accounts for 4 - 6% of all femoral fractures are complex injuries with the potential to cause long term disabilities<sup>1-3</sup>. If fractures of the hip are excluded, 31% of femoral fractures involve the distal portion. These are fractures involving the distal 15 cm of the femur including the metaphysis and/or the articular surface<sup>4</sup>. A classic bimodal distribution is found with a peak frequency in young men (in their 30s) and elderly women (in their 70s). The usual Context is a high energy trauma in a young patient and a domestic accident in an elderly person.<sup>5</sup> Because of severe soft tissue damage, extensive comminution, intrarticular extension and injury to quadriceps mechanism, the management of these fractures present a significant challenge to orthopaedic surgeons. A wide canal, thin cortex and poor bone stock of distal femur make open reduction in this area a great challenge. Watson Jones noted that "Few injuries present more difficult problems than supracondylar fracture of the femur."<sup>6-7</sup>

Current generation of distal femoral locking compression plates is precontoured based on the average bony anatomy of the adult population and they form a fixed angled construct. The pull-out strength of locking screws is higher than the conventional screws and is particularly useful in osteoporotic bones. These plates are designed to apply in minimally invasive fashion to preserve local biology and avoid problems with fracture healing and infection<sup>8,9</sup>. Kumar et al<sup>8</sup> from India studied 44 patients, out of these 44 patients 42 (95.45%) showed union and 2 patients developed non-union. Kumar also reported that there was no wound infection. Doshi et al<sup>2</sup> reported postoperative DVT in 20.8 % in patients with distal femur fractures.

This proposed study is planned to be conducted in our population to document success rate and postoperative complications. By decreasing complication rates in these patients will improve their quality of life as well as their productivity which will not only be helpful for themselves and their families but also for national productivity.

**Material and Methods:**

A total of 64 consecutive patients with supracondylar, intercondylar fracture femur duration less than 6 weeks were taken in this study. Patients with history of previous femoral fractures, open fractures, Known diabetic patients (with lab report FBS more than 126 mg/dl), with previous history of DVT and known hypertensives were excluded from our study. Patients meeting inclusion criteria and exclusion criteria were enrolled in this study from department of Orthopaedic Surgery, Nishtar Hospital Multan. Informed consent was taken from each patients and detailed history and physical examination was done for these study cases. Once registered, all relevant baseline investigation was arranged for these patients. All the relevant information was collected and noted in the study proforma and these patients were managed as per hospital protocols and were treated by locking femoral plates. The surgery was performed under the supervision of a senior Surgeon. Femur fracture AO type C1 (articular simple, metaphyseal simple) and C2 (articular simple, metaphyseal multifragmentary) were taken while Fracture at diaphyseal and distal femoral metaphyseal junction (an area of about 10 to 15 cm of distal femur) was taken as supracondylar fracture of the femur. These study cases were followed for their functional outcome such as union of fracture (Union was declared with clinical assessment of loss of pain on palpation over fracture site, full weight bearing & X-Ray (both AP and lateral views) shown obliteration of fracture line and callus formation on 12 weeks post-operative follow up) and complications like DVT (Calf pain with lack of compressibility and impedance of normal blood flow in affected vein with thrombus was diagnosed by color Doppler ultrasonography i.e. thrombus appears hypoechoic, affected vein is not compressible and absence of blood flow will confirm the diagnosis of DVT). The data was entered in especially designed proforma by researcher.

All the data was entered and analyzed using SPSS - 20. Mean and standard deviation for the age, height, weight, duration of surgery, hospital stay and duration of fractures was calculated. Frequencies and percentage were calculated for the categorical variables like gender, type of fracture, diabetes, hypertension, smoking, obesity, age groups, obesity and functional outcome (DVT and Union).

**Results:**

Our study comprised of a total of a 64 patients with supracondylar and intercondylar femur fracture who met inclusion criteria of our study. Of these 64 study cases, 24 (37.5%) were male patients while 40 (62.5%) were female patients. Mean age of our study cases was noted to be  $46.80 \pm 8.08$  years ranging from 34 years to 60 years. Mean age of the male patients was  $45.92 \pm 8.44$  years while that of female patients was  $47.33 \pm 7.91$  years ( $p = 0.504$ ) while 47 (73.4%) had their ages ranging from 41 years to 60 years of age. Mean height of our study cases was  $157.53 \pm 4.66$  centimeters, mean weight of our study cases was  $73.84 \pm 6.11$  kilograms. Mean BMI of our study cases was noted to be  $23.08 \pm 1.80$  kg/m<sup>2</sup>. Our study results have indicated that majority of our study cases i.e. 73.4% were normal weight, 11 (17.2%) were overweight and 6 (9.4%) were obese. Mean duration of fracture was  $2.48 \pm 1.33$  weeks ranging from 1 week to 6 weeks. Mean duration of surgery was  $65.86 \pm 12.29$  minutes ranging from 50 minutes to 105 minutes. Mean duration of hospital stay was noted to be  $7.22 \pm 1.33$  days ranging from 5 days to 12 days. Union of fracture was noted in 57 (89.1%) of our study cases while DVT was noted in 12 (18.8%) of our study cases.

**Table No. 1**  
**Stratification of union of fracture with regards to gender.**

Gender	Union of fracture		P – value
	Yes (n = 57)	No (n = 07)	
Male (n = 24)	22	02	<b>0.702</b>
Female (n = 40)	35	05	
<b>Total</b>	<b>64</b>		

**Table No. 2**  
**Stratification of union of fracture with regards to age.**

Age groups	Union of fracture		P – value
	Yes (n = 57)	No (n = 07)	
20 – 40 Years (n = 17)	13	04	<b>0.074</b>
41 – 60 Years (n = 47)	44	03	
<b>Total</b>	<b>64</b>		

**Table No. 3**  
**Stratification of union of fracture with regards to obesity.**

Obesity	Union of fracture		P – value
	Yes (n = 57)	No (n = 07)	
Normal Weight (n = 47)	43	04	<b>0.004</b>
Overweight (n = 11)	11	00	
Obese (n = 06)	03	03	
<b>Total</b>	<b>64</b>		

**Table No. 4**  
**Stratification of union of fracture with regards to type of fracture.**

Type of fracture	Union of fracture		P – value
	Yes (n = 57)	No (n = 07)	
Supracondylar (n = 41)	40	01	<b>0.007</b>
Intercondylar (n = 23)	17	06	
<b>Total</b>	<b>64</b>		

**Table No. 5**  
**Stratification of deep vein thrombosis with regards to gender.**

Gender	Deep vein thrombosis		P – value
	Yes (n = 12)	No (n = 52)	
Male (n = 24)	08	16	<b>0.043</b>
Female (n = 40)	04	36	
<b>Total</b>	<b>64</b>		

**Table No. 6**  
**Stratification of Deep vein thrombosis with regards to type of fracture.**  
 (n = 64)

Type of fracture	Deep vein thrombosis		P – value
	Yes (n = 12)	No (n = 52)	
Supracondylar (n = 41)	11	30	<b>0.043</b>
Intracondylar (n = 23)	01	22	
<b>Total</b>	<b>64</b>		

**Table No. 7**  
**Stratification of Deep vein thrombosis with regards to smoking.**  
 (n = 64)

Smoking	Deep vein thrombosis		P – value
	Yes (n = 12)	No (n = 52)	
Yes (n = 10)	10	00	<b>0.000</b>
No (n = 54)	02	52	
<b>Total</b>	<b>64</b>		

**Table No. 8**  
**Stratification of union of fracture with regards to mean hospital stay, duration of fracture and duration of surgery.**  
 (n = 64)

Parameter	Union		P – value
	Yes	No	
	Mean (SD)	Mean (SD)	
Hospital stay	7.32 (1.24)	6.43(1.81)	<b>0.095</b>
Duration of fracture	2.58 (1.33)	1.71 (1.11)	<b>0.106</b>
Duration of surgery	65.79 (12.45)	66.43 (11.80)	<b>0.898</b>

**Discussion:**

Distal fracture of femur present a huge surgical challenge in orthopedic surgery. These fractures are difficult to treat and operative treatment is usually recommended for favorable outcome. These are associated with high energy trauma (in the youngsters) and osteoporotic bones (in the elderly) and are frequently comminuted and intra-articular<sup>10-13</sup>.

Our study comprised of a total of a 64 patients with supracondylar and intercondylar femur fracture who met inclusion criteria of our study. Of these 64 study cases, 24 (37.5%) were male patients while 40 (62.5%) were female patients. Doshi et al<sup>2</sup> also reported female gender predominance with 91.66% female patients (22 out of 24 total cases). These findings are in compliance with that of our study results indicating very high female gender preponderance. Toro et al<sup>14</sup> also reported 75 % female patients while 25 % male patients. These results are similar to that of our study results.

Mean age of our study cases was noted to be 46.80 ± 8.08 years (with minimum age of our study cases was 34 years while maximum age was 60 years). Mean age of the male patients was 45.92 ± 8.44 years while that of female patients was 47.33 ± 7.91 years (p = 0.504). Our study results have indicated that majority of our study cases i.e. 47 (73.4%) had their ages ranging from 41 years to 60 years of age. Doshi et al<sup>2</sup> reported 73 years mean age which is quite higher than that of our study results. This difference is due to their inclusion criteria which included 57 – 94 years of age patients while we only included patients from 20 to 60 years of age. Nayak et al<sup>15</sup> reported 42 years mean age which is close to our study results.

Mean height of our study cases was 157.53 ± 4.66 centimeters, mean weight of our study cases was 73.84 ± 6.11 kilograms. Mean BMI of our study cases was noted to be 23.08 ± 1.80 kg/m<sup>2</sup>. Our study results have indicated that majority of our study cases i.e. 73.4% were normal weight, 11 (17.2%) were overweight and 6

(9.4%) were obese. Mean duration of fracture was  $2.48 \pm 1.33$  weeks (with minimum duration was 1 week while maximum duration was 6 weeks). Mean duration of surgery was  $65.86 \pm 12.29$  minutes (with minimum duration of surgery was 50 minutes while maximum duration was 105 minutes). Nayak et al<sup>15</sup> reported 70 minutes mean duration of surgery. These study results are in compliance with that of our study results. Mean duration of hospital stay was noted to be  $7.22 \pm 1.33$  days (with minimum duration of hospital stay was 5 days while maximum was 12 days). A study conducted by Nayak et al<sup>15</sup> reported 9 days mean duration of hospitalization which is close to our study results. Union of fracture was noted in 57 (89.1%) of our study cases while DVT was noted in 12 (18.8%) of our study cases. Kumar et al<sup>8</sup> from India studied 44 patients, out of these 44 patients 42 (95.45%) showed union and 2 patients developed non-union. These findings are close to our study results. Toro et al<sup>14</sup> reported 75 % successful outcome which is similar to our study findings. Doshi et al<sup>2</sup> reported 20.8 % DVT which is similar to that of our study results.

### Conclusion:

There was high frequency of union of fracture observed in our study. Our study results support the use of locking femoral plate fixation in functional outcome of supracondylar and intercondylar fracture of femur as it is safe and reliable. Union of fracture was significantly associated with obesity and type of fracture while DVT was significantly associated with male gender, type of fracture and history of smoking.

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