

## An Overview of Cases of Fracture Distal Femur: A Hospital Based Study

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### ABSTRACT

**Introduction:** Modernization has resulted into increase in number of road traffic accidents resulting into higher frequency and severity of distal femur fractures. Distal femoral fractures shows a bimodal age distribution. The present study aims to study demographic details of patients and mode of injury among patients with fracture distal femur.

**Materials and Methods:** This Study was conducted at Department of Orthopaedics, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, UP, India. All the patients admitted with fracture distal femur were included in the study. All the patients were subjected to a detailed history with particular emphasis on mode of injury, time of injury, interval between injury and reporting and nature of treatment taken prior to admission.

**Results:** Mean age of fracture distal end of femur in our series was 46.29 years. Male Female ratio was 4.5:1 Mean age of females (58.61 Yrs) was more than the mean age of males (43.58 years). Most common mode of injury was road traffic accident accounting for 78 of the cases. Right side was involved more than left side (2.22 times). Most common type of fracture we managed was Type A1 43%. 24% of the cases were having associated injuries.

**Conclusion:** Road traffic accident was the most common mode of injury in our series accounting for 78% of the cases.

This was followed by fall from height as the cause of fracture in 11% cases. The incidence of fracture distal end of femur in males is far higher than in 4.5:1 in our series. This may be because in our country India, males are more involved in outdoor activities and are thus more prone to trauma which was the major causative factor in our series, as compared to western world where males and females share equal outdoor responsibility.

**Keywords:** Distal Femur Fracture; Orthopaedics; Road Traffic Accidents.


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### INTRODUCTION

Modernization has resulted into increase in number of road traffic accidents resulting into higher frequency and severity of distal femur fractures. Knee joint is most vulnerable for injuries in accidental injuries fracture, since bumper of most of the car is at the knee height. Vehicular accidents invariably lead to higher incidences of bumper fractures (fracture around knee).<sup>1</sup> Distal femoral fractures occur in a bimodal distribution with younger patients more likely to be male involved in high-energy trauma and older patients are more likely to be female with injury sustained from low-energy etiology such as fall from standing.<sup>2</sup> In the early 1960s, there was a great reluctance towards operative management of these fractures because of high incidence of infection, non-union, mal-union, inadequate fixation and lack of proper instruments, implant as well as antibiotics. Then, the traditional management of displaced supracondylar fracture of

femur was along the principle of Watson Jones & John Charnle. Elderly patients with severe osteoporosis add further to the difficulties in management of fractures around knee which requires restoration of articular congruency for painless free movements of joint.<sup>3</sup>

### MATERIALS AND METHODS

This Study was conducted at Department of Orthopaedics, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, UP, India. All the patients admitted in the department of Orthopaedics with fracture distal femur were included in the study.

All the patients were subjected to a detailed history with particular emphasis on mode of injury, time of injury, interval between injury and reporting and nature of treatment taken prior to admission.

General and systemic examination as well as local examination of the patients was carried out. Thorough assessment of patient to rule out head, chest, abdominal or associated pelvic injury was conducted. Evaluation of patients in terms of age, gender, mode of injury and period between injury and arrival was done. Musculo-skeletal examination of patient to rule out associated fractures. Stabilization of patient with intravenous fluids, oxygen and blood transfusion as and when required. Careful assessment of injured limb as regards to neurovascular status.

Inclusion criteria for the study were patients who presented within three weeks of injury, Closed fracture of distal femur, grade 1/11/111 A/111-B compound fractures (Gustilo Anderson classification) 1s, those who have fracture of distal femur Type -A, Type C1, Type C2 as per A.O. classification, highly comminuted supracondylar fractures, fractures that require opening the knee joint to stabilize the femoral condylar segment and distal fracture in osteoporotic bone. Cases that were excluded from the study were cases of active infection, fixed deformity at knee joint, obliterated medullary canal due to previous fracture or infection, supracondylar fractures extending up to isthmus and AO type C3 fractures. Pre-operative Planning and Operative Procedures were carried accordingly.

**Table 1: Distribution of Patients According to Age**

Age (In Yrs)	n	%
15-25	10	10%
26-35	25	25%
36-45	21	21%
46-55	15	15%
56-65	15	15%
>65	14	14%

**Table 2: Distribution of Patients According to Male /Female Ratio**

Sex	n	%
Male	82	82%
Female	18	18%

**Table 3: Distribution of Patients According to Age & Sex Ratio**

Age (years)	Male	Female
15-25	10	0
26-35	23	2
36-45	20	1
46-55	11	4
56-65	9	6
>65	9	5

**Table 4: Distribution of Patients According to Mode of Injury**

Mode of Injury	n	%
RTA	78	78%
Fall from Height	11	11%
Trivial Fall	6	6%
Assault	5	5%

**Table 5: Relation between Mode of Injury and Age**

Mode of Injury	Mean Age (years)
RTA	40.26
Fall from Height	62.90
Trivial Fall	77.50
Assault	66.20

**Table 6: Distribution of Patients According to Side Involved**

Side	n	%
Left	31	31%
Right	69	69%

**Table 7: Distribution of Patients According to Nature of Fracture**

Nature	n	%
Closed	67	67%
Open Type -I	16	16%
Open Type II	13	13%
Open Type III A	3	3%
Open Type III B	1	1%

**Table 8: Classification (Fractures Were Classified As Per Muller's Classification<sup>5</sup>)**

Grade	n	%
A1	43	43%
A2	28	28%
A3	16	16%
C1	10	10%
C2	3	3%

**Table 9: Distribution of Patients According to Associated Injury**

Injury	n
Fracture Leg Bones	7
Fracture shaft Femur	5
Fracture Tibial Condyle	6
Chest Injury	2
Fracture Forearm	3
Fracture Patella	3
Fracture Tibial spine	2

## RESULTS

Maximum number of patients fell in the age group of 25-35 years with age ranging 18 years of 95 years with the mean age of 46- 29 years (table 1). Male – Female ratio in our series 4.5:1 with male outnumbering females with a large margin (table 2).

Maximum number of females belongs to 56-65 years while majority of males were in either 26-35 age group. Mean age of males was 43.58 years while the mean age of females was higher at 58.61 years (table 3).

Road traffic accident was the most common mode of injury accounting for 78% of the cases. Assault was encountered in only 5% of the cases (table 4).

Fractures occurred with trivial fall in comparatively elderly age group (mean 77.5 years) while road traffic accident occurred in comparatively younger age group (mean age 40.26 years) (table 5). Right side was involved 2.22 times more than left side (table 6). In the present study, 33 compound fractures, 16 were type I, 13 were type II, 3 were type III-A and 1 being type III-B according to Gustilo-Anderson's classification<sup>4</sup> (table 7).

Fractures were classified as per Muller's classification<sup>5</sup> and only Type A, Type C1 & C2 were included in the study. In our series most common type of fracture was Type A1 accounting for 43% of the cases (table 8). Most common associated injury in our series was fracture shaft tibia in 7 cases followed by fracture tibial condyle in 6 cases (table 9).

## DISCUSSION

In our study age distribution showed that the maximum number of patients was in the age group of 26-35 years, with the mean age of 46.29 years. Males had an average age of 43.58 years and females had an average age of 58.61 years. Lauri Handolin et al<sup>6</sup> of Helsinki University Hospital in his study showed that males had an average age of 52:3 years and women with an average age of 66.5 years. Comparing their observation with ours, we observe that mean age of females in our 'study is definitely higher than the mean age of males, though the mean age in Lauri Handolin et al<sup>6</sup> series is much higher than that of ours. This is because females are more prone to fractures in the post-menopausal period.

Our results of mean age are also comparable to those of Gellman RE et al<sup>7</sup> who studied 22 patients with an average age of 50 years ranging from 26 to 84 in their study. Also men involved were younger at 39 years as compared to women at 60 years of age.

The incidence of fracture distal end of femur in males is far higher than in 4.5:1 in our series. Male/Female ratio in Olerud S et al<sup>8</sup> series is 7:3 and in Yang RS et al<sup>9</sup> series were 3:1 showing male outnumbering females as also observed in our series. But our observation does not correlate with those of other western authors who published females outnumbering males in most of their series such as Gellman RE et al<sup>7</sup> (M: F= 10: 12), Handolin et al<sup>6</sup> (M : F = 4:7). This may be because in our country males are more involved in outdoor activities and are thus more prone to trauma which was the major causative factor in our series, as compared to western world where males and females share equal outdoor responsibility.

An estimated 6% of all fractures of the femur account for the distal part of the bone. The fractures occur in a bimodal distribution. One group including patients below 40 years of age, predominantly males, sustaining high-energy trauma such as traffic accident or a fall from heights. The other group is consisting of patients >50 years, predominantly females, with osteoporosis, who sustain relatively low energy trauma.<sup>10</sup> Road traffic accident was the most common mode of injury in our series accounting for 78% of the cases. This was followed by fall from height as the cause of fracture in 11% cases. Road traffic accident attributes to the highest number also in most of the other studies. [Yang RS et al<sup>9</sup> reported 71 % of the fracture distal third femur caused by RTA and Gellman RE et al<sup>7</sup> who reported RTA -59%, Fa11 -36%, Assault =10%].

In our study right side was involved relatively more (69%) than the left (31%) with none of the case having bilateral distal third femora1 fractured. Lauri Handolin<sup>6</sup> studied 44 patients with 46

supracondylar fracture. In his series right femur was involved in 29 (63%) cases and left one in 17(37%) of cases.

We have classified fracture distal femur as described by Muller et al<sup>5</sup> and expended in AO IOTA classification. As type A, C1 and C2 are only suitable for intramedullary supracondylar nail therefore only these type of fractures were included in the present study. In our series we encountered 43 type A1 (43%) , 28 type A2 (28%) 16 type A3 (16%) and 10 type C1 (10%) and C2 ( 3%).

Similar observations with slight variation were noted by Watanabe Y et al<sup>11</sup> who reviewed 24 fracture distal third femur managed by Intramedullary Supracondylar Nail with 18-Type A1 (56%), 1-Type A2 (3%), 2-Type C1 (6%), 1-Type c2 (3%), 2-Type c3 (6%), Janjing et al<sup>12</sup> who observed 60% Type-A fractures 40%o Type-C, fractures in a series of 26 cases. Gellman RE et al<sup>7</sup> in a series of 24 cases observed. 3-Type A1 (12.54%) ,3- Type A2 (12.54%), 5-Type A3 (20.83%), 4- Type C 1 (16.66%), 3-Type C2 (12.54%), 6-Type C3 (25%) fractures.

Kumar et al<sup>13</sup> in their sense of management of Supracondylar 'fracture in elderly people included only Type A fractures, thereby excluding the cases with intra-articular extension. In their series of 16 cases there were 4-Type A1 (25%o), 11-Type A2 (69%), 1-Type A3 (6%) fractures.

24% cases in our series were suffering from other associated injuries. Fracture ipsilateral tibia was most common 7 cases associated injury followed by fracture Tibial condyle in 6 cases. Other associated injuries were fracture shaft femur (opp) 5 cases, fracture forearm bones 3 cases, chest injury 2 cases, fracture patella 3 cases, and fracture tibial spine 2 cases. In his study of fracture distal third femur Olerud S<sup>8</sup> observed 31% cases with multiple injuries. Yang RS et al<sup>9</sup> observed 69% cases with multiple injuries whereas Gellman RE et al<sup>5</sup> observed 50% incidence of poly-trauma. In all these series incidence of poly-trauma is far more than what we see in our study. This may be because there is higher incidence of high velocity trauma in western countries as compared to our country due to better road conditions and technologically advanced automobiles with higher speed.

## CONCLUSION

Mean age of fracture distal end of femur in our series was 46.29 years. Road traffic accident was the most common mode of injury in our series accounting for 78% of the cases. This was followed by fall from height as the cause of fracture in 11% cases. The incidence of fracture distal end of femur in males is far higher than in 4.5:1 in our series. This may be because in our country India, males are more involved in outdoor activities and are thus more prone to trauma which was the major causative factor in our series, as compared to western world where males and females share equal outdoor responsibility.

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