

A Prospective Study on Functional Outcome of Fracture Supracondylar and Inter Condylar Fracture of Femur Treated With Locking Plates

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Abstract

Background: Distal femur fracture accounts for 3-6% of all femur fractures. Management is difficult as mostly fractures are unstable, comminuted with articular extension with extensive surrounding soft tissue injury. The introduction of distal femur LCP has brought a drastic difference in management of supracondylar and intercondylar fractures. **Aim:** To evaluate the functional outcome of distal femur fractures treated with distal femoral LCP. **Subjects and Methods:** The study was conducted at the Department of Orthopedics, Muzaffarnagar Medical College, Muzaffarnagar during January 2018-2019 period. A total of 10 patients were included in the study. The method used for fixation was closed or open reduction and internal fixation with distal femoral LCP. All the patients were followed up for a period of one year and functional outcome was assessed according to Neer's score system. **Results:** On evaluation according to Neer's criteria our results were as follows-Out of 10 patients 3(30%) had excellent, 6(60%) had satisfactory and 1(10%) had unsatisfactory result. **Conclusion:** We conclude that locking plate provides the advantage of combining conventional screw capacity with fixed angle technology, that fixed angle screw provide stable fixation in small articular block, protecting against collapse and loss of alignment in osteoporotic patients.

Keywords: Supracondylar & Intercondylar femoral fractures, Locking Plate, Neer's Score.

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Introduction

Fractures of the distal femur accounts for 3-6% of all femur fractures. Supracondylar & Intercondylar fracture of the distal femur historically have been difficult to treat as mostly fracture are unstable, comminuted & usually occurs in elderly osteoporotic patients or young adult with high velocity trauma. Fracture occurs as a result of severe axial load with varus, valgus and rotational forces. Shortening of fracture with varus and extension of the distal articular segment usually occurs.

AO classification for supracondylar fracture

A=Extraarticular

A1=simple (two part)

A2=metaphyseal wedge

A3=metaphyseal complex (comminuted)

B=partially articular (unicondyle)

B1=lateral condyle (fracture in sagittal plane)

B2=medial condyle (fracture in sagittal plane)

B3=frontal (fracture in coronal plane)

C=complete articular (bicondylar)

C1=articular simple and metaphyseal simple

C2=articular simple and metaphyseal multifragmentary

C3=multifragmentary articular

Various factors play role in management of fracture like

degree of comminution of the fracture, extent of injury to surrounding soft tissue, damage to articular surface, quality of bone (specially the presence of osteoporosis), associated fracture of patella and tibial plateau, associated neurovascular injury. Proximity of these fractures to knee joint makes difficult in regaining full knee motion & function. Various techniques have been utilized for the treatment of these fractures which include blade plate, dynamic condylar screw, condylar buttress plate, but poor results are found due to osteopenia, comminution & less rigid fixation. Evolution of locking plate technology for these fractures seems to have revolutionized the management of these fractures as screw are locked in the plate providing good rigid function even in osteoporotic patients hence this study has been devised to find out benefit of locking plate in these type of fractures with regard to functional outcome by open or closed reduction & internal fixation with plate osteosynthesis.

Aims & Objectives

Prospective study on functional outcome following open /closed reduction & internal fixation by locking plate in supracondylar and intercondylar fractures of femur with regards to. 1. Pain, 2. Range of motion of knee, 3. limb length discrepancy, 4. Any persisting deformity, 5. Bony union.

Subjects and Methods

the study was conducted at the Department of Orthopedics Muzaffarnagar Medical College , Muzaffarnagar during January 2018-2019 period . Patient selection-Inclusion criteria duration of injury less than 10 days, patient with age more than 18 years, patient with simple fractures. Exclusion criteria-age less than 18 years, patient with compound fractures, patient not willing for surgery, associated neurovascular deficit, associated dislocation of knee, associated ipsilateral lower limb injury, any previous fracture or any other knee pathology of ipsilateral limb, any history of previous neuromuscular weakness. Patients admitted in orthopaedic department were subjected to clinical examination and investigations to ascertain their fitness for surgery and anaesthesiaas required on the line of management in consultation with both anaesthetist and physician. All patients were kept on balanced below knee skin traction on Bohler Braun frame while awaiting fixation, after anaesthesia clearance fixation of fracture was undertaken. Patients were called up at regular intervals at 3,6,12 weeks and 6 months. At each follow up visit, progress of the patients were noted with their complaints if any and recorded in accordance with Neer's criteria.

Neer's criteria	Maximum score
Pain	20
Function	20
Work capacity	10
Gross anatomy	15
Radiological	15
Joint motion	20
Total	100

Pain

No pain	20
Intermittent pain	16
Fatigue on doing work	12
Restricted function due to pain	08
Constant night pain	04

Function

Functioning as before fracture	20
Mild restriction of function	16
Restricted function (stairs up and down).	12
Severe restrictions of function (patient walking with cane)	08
Patient using crutches or knee brace.	04

Work Capacity

Employed in same work as before fracture	10
Not employed in same work	00

Gross Anatomy

Thickening of bone without any angulation or shortening	15
Angulation<5 ⁰ & shortening <0.5cm.	12
Angulation>5-10 ⁰ &shortening>0.5-2cm	09
Angulation>10-15 ⁰ & shortening >2-3cm	06
Nonunion at fracture site	0

Radiological

Near normal	15
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Angulation 5 ⁰ & limb length discrepancy 0.5cm	12
Angulation 10 ⁰ & limb length discrepancy 1cm	09
Angulation 15 ⁰ & limb length discrepancy 2cm	06

Joint Motion

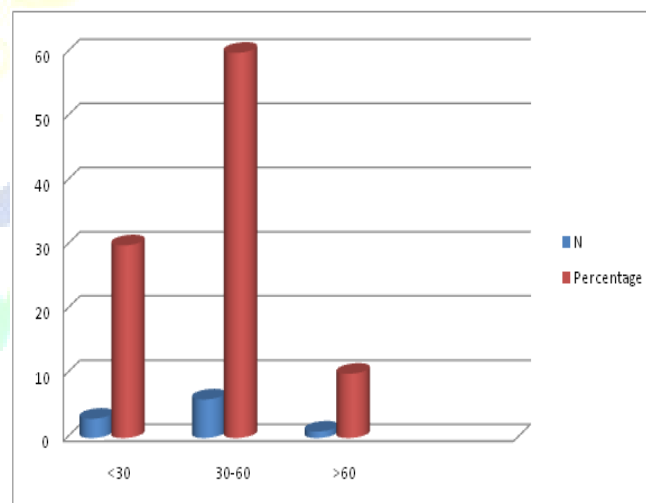
>135 ⁰	20
100-134 ⁰	16
80-99 ⁰	12
60-79 ⁰	08
40-59 ⁰	04
<40	00

Total Score

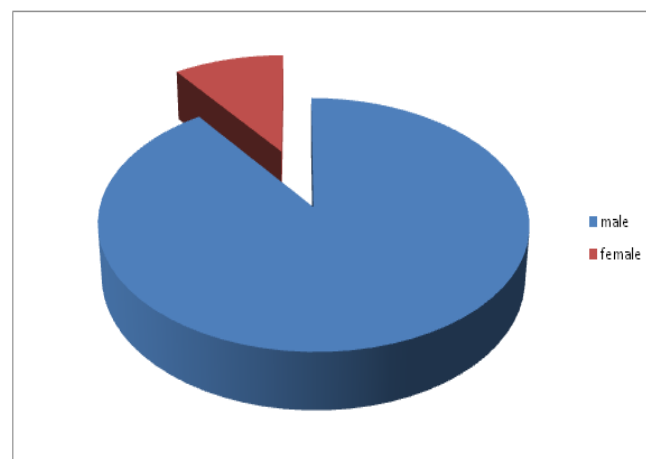
>85	Excellent
70-85	Satisfactory
55-69	Unsatisfactory
<55	Failure

Results

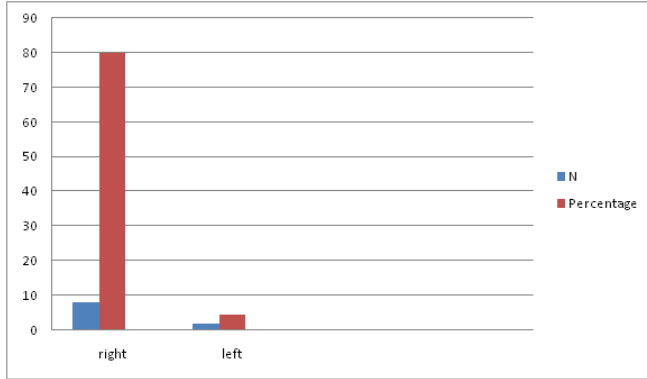
10 cases of fractures supraconylar & intracondylar femur were admitted in Department Of Orthopedics surgery Muzaffarnagar Medical College January 2018 - 2019 after fulfilling inclusion criteria.



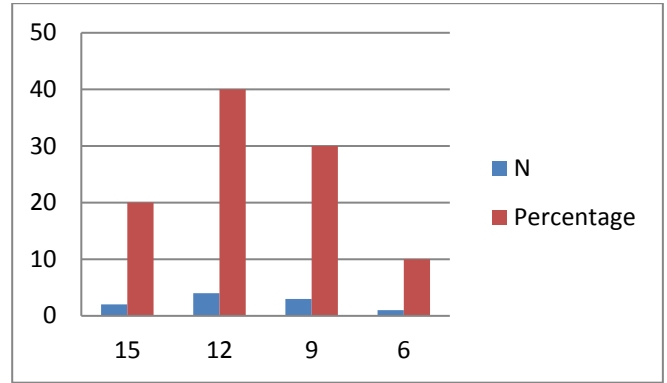
Graph 1: Age distribution of patients



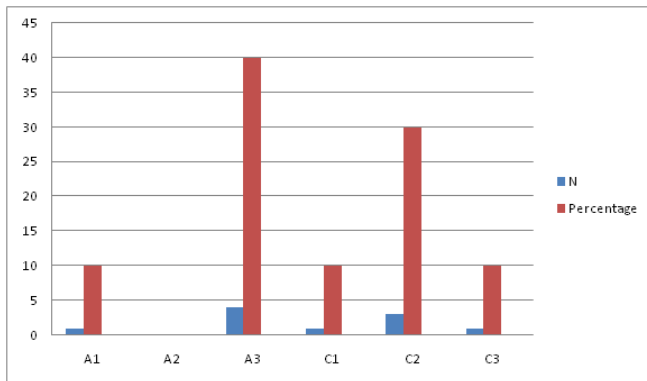
Graph 2: Sex distribution of patients



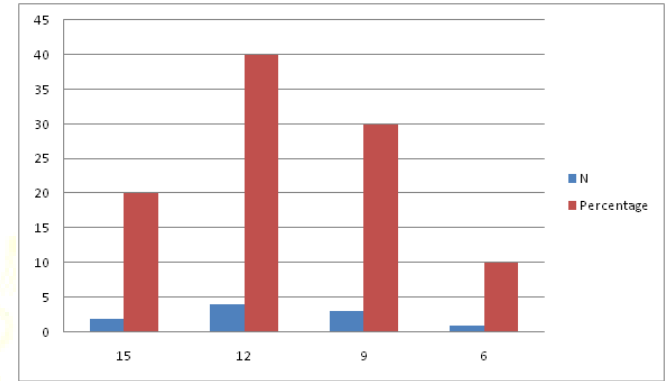
Graph 3: Side Involvement



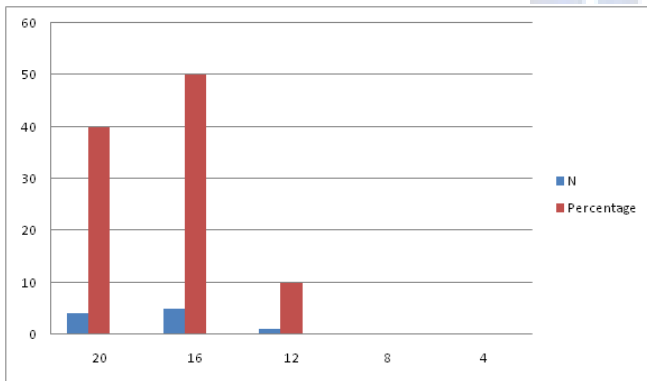
Graph 7: Analysis of gross anatomy of patients



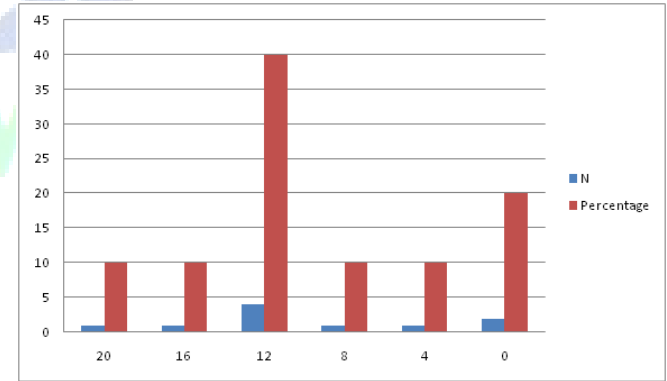
Graph 4: AO classification of patients



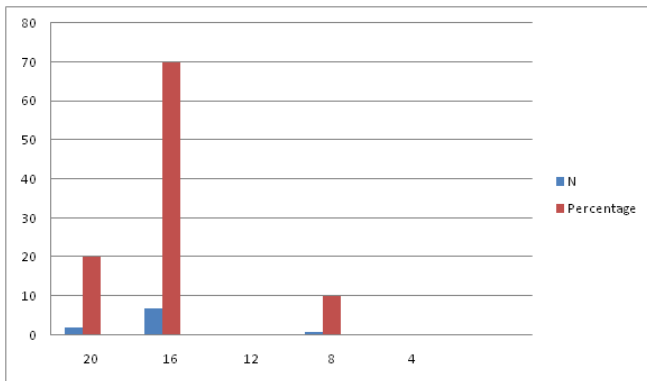
Graph 8: Analysis of radiological finding of patients



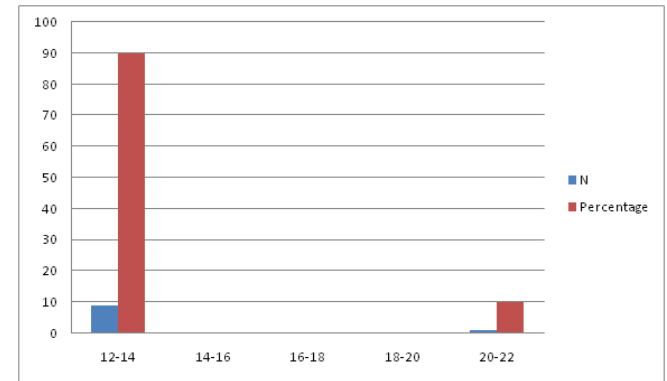
Graph 5: Analysis of pain distribution of patients



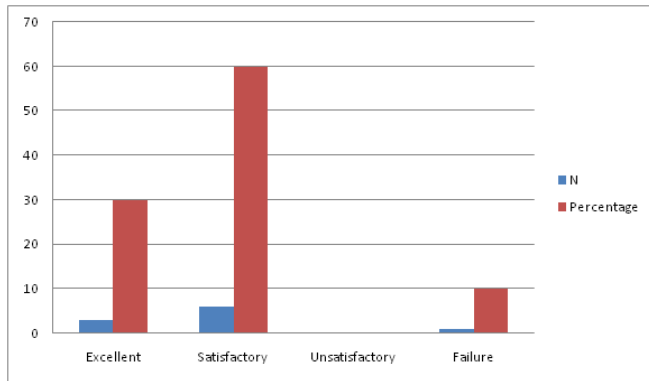
Graph 9: Analysis of joint movements of patients



Graph 6: Analysis of function of patients



Graph 10: Distribution of union duration in patients



Graph 11: Analysis of result of patients



Figure 1

Discussion

Treatment of supracondylar and intercondylar fracture femur has always been a challenge to orthopaedic surgeons. Vast spectrum of injuries of supracondylar and intercondylar fracture have been managed by various methods from time of Steward, Sisk et al(1996) and still it is difficult to make conclusion about which treatment is best in which situation. By virtue of this study we have attempted to evaluate the efficacy of locking plate in treatment of supracondylar and intercondylar fractures prospectively. The distribution of age in this study shows that maximum number of cases were from age group 30-60 years and mean age was 42.2 years. The distribution of sex shows that males outnumber the females; males are more involved in outdoor activities and hence more prone to trauma. The time lapse between injury and surgery was 8.6 days and cases reported hospital within 18 hours. In our study no correlation between time lapse and final results were found, however manipulation and fracture reduction became easier in fresh cases.

Cases in our study were classified as per AO classification, A3 is most common in 40% cases followed by C2 in 30% indicating high energy trauma is on rise. Similar observation was seen by Benirschke et al(1993) in which

60% cases of distal femoral fracture belongs to group A. In our study intermittent pain is most common in 50% followed by no pain in 40%, which is similar to observation by Ketterl R, Kostler W, Wittwer W(1997) in which 50% patient has no pain 40% has occasional pain and 10% frequent pain.



Figure 2



Figure 3

Mild restriction of function is most common in 90% patients followed by functioning before fracture in 20% patients.

All patients were employed in the same work as before fracture which is similar to study done by Shewring & Meggitt et al (1990) in which most patients quickly regained their mobility and returned to their original work. Angulation $<5^{\circ}$, shortening $<0.5\text{cm}$ is most common in 40% patients. Observation done by Aqus H, Reisoqu A et al(2002) found that 50% patient has leg length discrepancy (1-2.5cm) and 15% patient has valgus deformity of 10° .

There was no loss of extension in 80% cases, while joint range of motion ($80-99^{\circ}$) is most common in 40% cases. Similar observation done by Weight M, Colling C et al(2004) where average range of motion was $5-114^{\circ}$.

Union was achieved in all cases in our study within 12-14 weeks. Krettek et al observed average time of bone healing as 11.6 weeks in 80% patients using osteosyn thesis with

DCS. Similar observation were found by Steven J,Rabin MD(2004) in which bone healing took place in 12 weeks in 90% cases.

In our study cases 60% has satisfactory results,30% has excellent results, while failure in 10% were found.This is similar as observed by Ketterl R, Kostler W, Wittwer W(1997) ,satisfactory results were found in 55%,excellent results in 40% and failure in 5%.

Conclusion

Based on observation and discussion the following conclusions were drawn from this study. Fracture of supracondylar and intercondylar fracture often are unstable and comminuted and tend to occur in elderly osteoporotic patients or young adults with high velocity trauma and both of these feature make conservative treatment unsatisfactory and internal fixation difficult.Young males and older females are more prone to sustain this type of injury. Major causative factor for these fractures is road traffic accident in young males and slip on ground in elderly females. Maximum number of cases belong to age group 30-60 years and mean age was 42.2 years indicating higher incidence in young adults. Maximum number of cases is in A3 class followed by C2 which indicates severity of trauma is on rise. Despite increasing severity of trauma achieved range of movement in 80-99⁰ in most patients. Despite increasing severity of trauma union occurred in all cases and mean time of union was 12-14 weeks in 90% patients. No complication was found in 90% cases. Good results can be obtained only by open reduction and rigid internal fixation followed by early range of motion exercise of knee joint. Thus in our study we conclude that open reduction and internal fixation of supracondylar and intercondylar fracture by locking plate in perspective of increasing severity of trauma have a distinct advantage over other modalities of surgical intervention in terms of nil or occasional pain, early

mobilization and weight bearing, good range of motion, minimal limitation of activity, less deformity, early bony union, minimal limb length discrepancy. In the end we conclude that locking plate provides the advantage of combining conventional screw capacity with fixed angle technology, that fixed angle screw provide stable fixation in small periarticular block, protecting against collapse and loss of alignment in osteoporotic patients.

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