International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(4): 563-568

www.orthopaper.com
Received: 25-08-2021
Accepted: 28-09-2021

Dr. Pawan Kumar
Associate Professor,
Department of Ortho,
Hazaribag Medical College,
Hazaribag, Jharkhand, India

Dr. Mritunjay Kumar
Senior Resident, Department of Ortho, Hazaribag Medical College, Hazaribag, Jharkhand, India

Corresponding Author:
Dr. Mritunjay Kumar
Senior Resident, Department of Ortho, Hazaribag Medical College, Hazaribag, Jharkhand, India

Functional outcome of management of distal femur fractures with locking compression plate

Dr. Pawan Kumar and Dr. Mritunjay Kumar

DOI: https://doi.org/10.22271/ortho.2021.v7.i4h.2935

Abstract
Distal femur fractures are difficult to manage and the selection of implant approach for internal fixation remains controversial. These fractures can be treated with either interlocking nail or locking compression plates. Locking compression Plate is one of the standard treatments for distal femoral fractures [1.] There are few reports on the relationship between the screw fixation and bony union while fixing by the bridge plate (relative stability) method. The aim of this study is to evaluate functional outcome, fracture healing, and complications of distal femoral intraarticular fractures using locking compression plates. Material and methods: We reviewed 40 distal femoral fractures (type A & C – Muller classification) treated with distal femoral locking compression plates between 2019-2021. The study was conducted in SB Medical College, Hazaribag from the month of August 2019 to July 2021.There were 24 males and 16 females with mean age 35 years (Range, 25-85 years). Two different mechanisms are responsible for such trauma; high energy trauma is seen commonly in young adults and low energy or trivial trauma in the elderly and osteoporotic population. These fractures were fixed with DF-LCP with or without bone grafting where the distal femur fractures were associated with extensive bone loss. Results: Of the 40 patients, mean follow up period was 20 months (12-22 months). The mean time for radiological union was 14 weeks. (Range 12-15 weeks), except one patient which has gone for nonunion. At the latest follow up, ROM > 120˚ noted in 24 patients, 90-120˚ in 11 patients and 70-90˚ in 5 patients.29 patients (72.5%) had good/excellent outcome.6 cases (15%) were fair and poor result just in 5 cases (12.5%). Conclusion: use of standard lateral approach for simple intra-articular distal femoral fractures(C1) and transarticular[2]/minimally invasive techniques for complex intra-articular fractures(C2/C3) results in improved exposure of the knee joint and better union rates with low incidence of bone grafting.

Keywords: Osteosynthesis distal femoral fractures, locking compression plate

Introduction
The supracondylar area of the femur is defined as the zone between the femoral condyles and the junction of the metaphysis with the femoral diaphysis. This comprises approximately the distal 15 cm of the femur, as measured from articular surface. Distal femur fractures account for an estimated 6% of all femur fractures [3]. The annual incidence of distal femur fractures is around 37/1, 00,000 people [4]. Two different mechanisms are responsible for such trauma; high energy trauma is seen commonly in young adults and low energy or trivial injury in the elderly and osteoporotic population. The treatment of these fractures has evolved over the past 50 years from closed treatment to open reduction and internal fixation with locked compression plating or intramedullary nailing [5]. The Locking compression plate was developed to give surgeons the opportunity to combine principles of internal fixation and dynamic compression, depending on the fracture site, as it contains Combi holes [6]. These plates are anatomically contoured to fit the distal femoral flare, and as they are used by MIPPO technique, they allow prompt healing, lower rate of infection, and reduced bone resorption as blood supply is preserved.

Aims of Study
The aim of the study is to evaluate functional and radiological outcome, fracture healing, and complications of distal femoral intraarticular fractures using locking compression plates [7].

Materials and Methods

The study was conducted in patients treated for distal femur fracture in SB Medical College, Hazaribag from the month of October 2019 to September 2021. Forty patients having distal femur fractures were taken into the study. There were 24 males and 16 females with mean age 35 years (Range 25-85 years). The cases were evaluated as per the Muller Classification [8] and were fixed with Distal femoral locking compression plate with /without Bone grafting where the distal femur fractures were associated with extensive bone loss.

Technique

The patients were positioned supine with a sand bag beneath the ipsilateral hip to internally rotate the leg. A direct lateral approach was used to expose the fracture site. Skin incision was longitudinal and distally was centered over the lateral epicondyle. Fractures were reduced under direct vision using manual traction. Distal femur- locking compression plate length, axial and rotational alignment were checked and then plate placed over the fracture site. Fixation was achieved with distal and proximal locking screws. Bone grafting done for fractures associated with extensive bone loss.

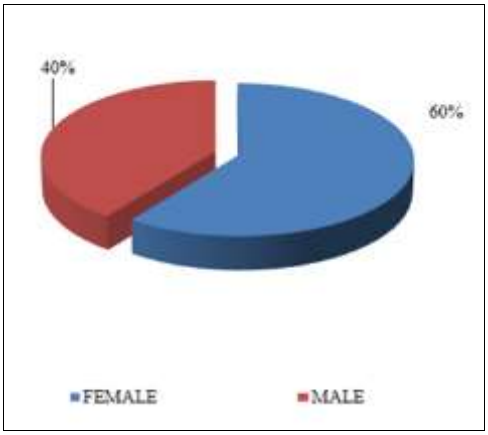
Follow up: Cases followed after 4 weeks, 8 weeks, 12 weeks, after 6 months and finally after 18 months. Weight bearing started once the bony consolidation takes place. Post operatively Neer's rating system was used to assess the functional outcome

Observation and Results

The study consisted of forty patients having 24 males and 16 females. The patient's ages ranged from 25-85 years, (Mean age 35 years). The causes of fractures were motor vehicle accident in 23 patients and accidental fall in 17 patients.26 fractures involved the right side and 14 involved the left. The average length of hospitalization was 2 weeks. According to the MULLER classification system, there were 02 Type A1, 05 Type A2, 18 Type A3, 02 Type C1, 04 Type C2 and 09 Type C3 fractures. Successful fracture union was defined as complete bridging callus in three cortices, together with painless full weight bearing. Functional outcome was rated as per NEER'S RATING SCORE; we got excellent results in 07cases, good in 22, fair in 04 and poor in 07 patients.

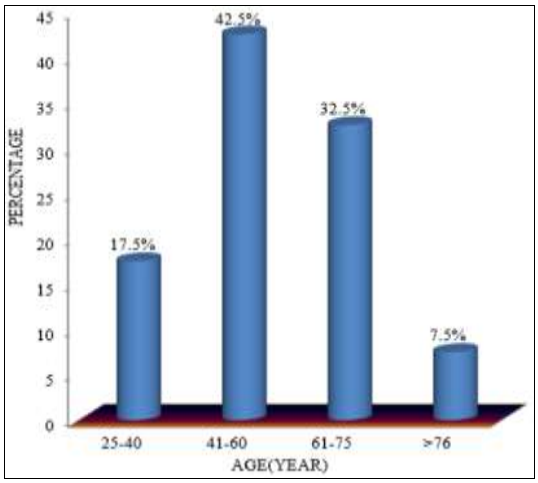
Gender Distribution

Gender	Number	Percentage
Male	24	60
female	16	40
Total	40	100



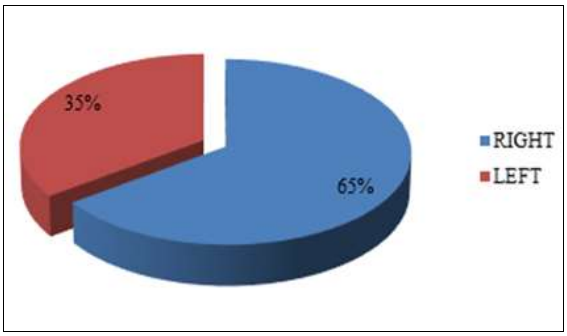
Age Distribution

Age (Year)	Number	Percentage
25-40	7	17.5
41-60	17	42.5
61-75	13	32.5
>76	3	7.5
Total	40	100



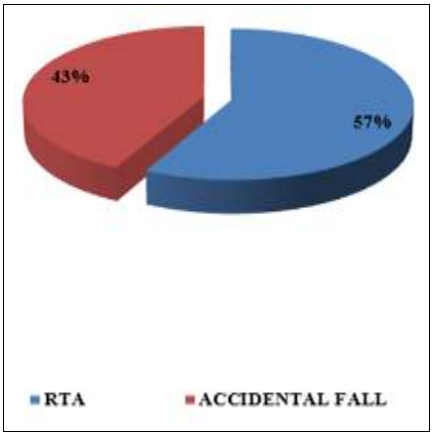
Side Distribution

Side	Number	Patients
Right	26	65
Left	14	35
Total	40	100



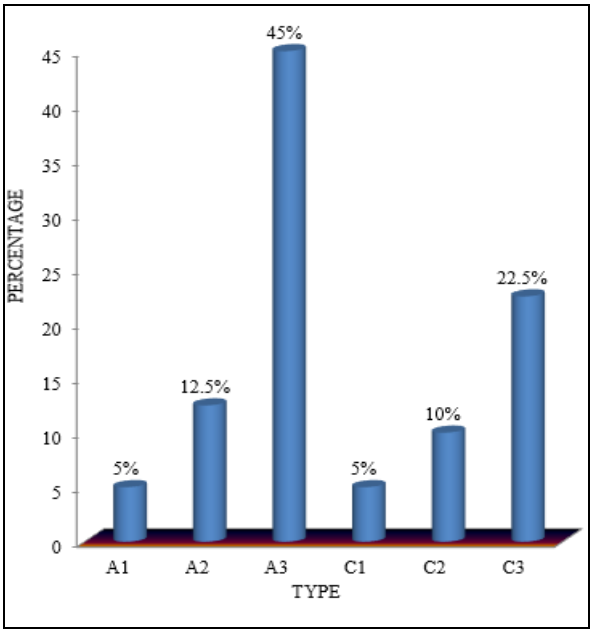
Mechanism of Injury:

Mechanism	Number	Parentage
RTA	23	57.5
Accidental Fall	17	42.5
Total	40	100



Muller Classification of the Fractures

Type	Number	Percentage
A1	1	2.5
A2	4	10
A3	12	30
C1	2	5
C2	4	10
C3	17	42.5

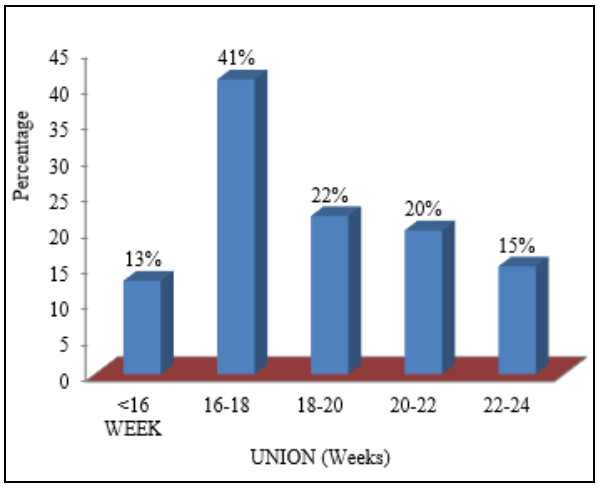


Analysis of Outcome Based on Neer's Criteria:

Grading	Number	Percentage
Excellent	7	17.5
Good	22	55
Fair	6	15
Poor/Failure	5	12.5

Distribution of Sample by Time taken for Fracture Union:

Union (Weeks)	No. Of Cases	Percentage
<16 Weeks	5	13
16-18	12	41
18-20	9	22
20-22	8	20
22-24	6	15

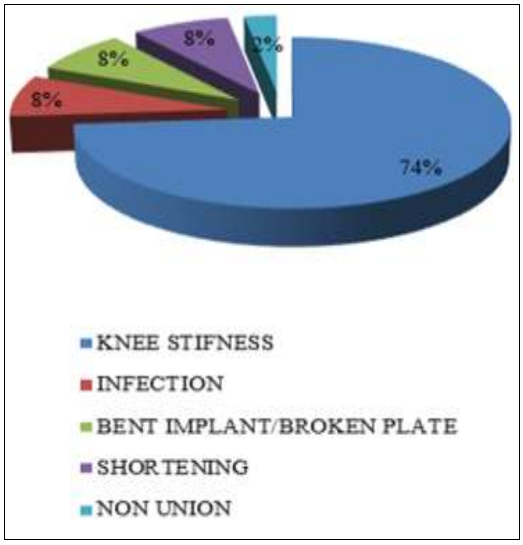


Distribution of Sample by Knee Flexion

Knee Flexion (Degree)	No. Of Cases	Percentage
<90	5	12.5
91-119	11	27.5
>120	24	60

Complication

Complication	Number	Percentage
Knee Stiffness	16	40
Infection	3	7.5
Bent Implant/ Broken Plate	3	7.5
Shortening	3	7.5
Non Union	1	2.5



Clinical and Radiological Photograph:
Case- 01: Bibha Devi

Pre-Operative AP & Lateral X-ray

Immediate Post Operative AP & Lateral X-Ray

Post Operative AP & Lateral After Two Months

Post Operative AP & Lateral After Four Months

After 6 months: AP & LATERAL X-RAY

Clinical Photograph Showing Full Range Of Extension

Clinical Photograph Showing Full Range Of Flexion After Three Months Of Follow Up

Complication X-Ray Showing Broken DFLCP

Complication X-Ray Showing Implant Failure

Complication X-Ray Showing Broken Screw

Discussion

This study consists of 40 cases of closed and open fractures of the distal femur treated by open reduction and internal fixation/MIPPO using locking compression plates. In this study 23 patients were injured as result of a VA (Vehicular Accident) which included both two wheelers and four wheelers. 17 patients sustained injury due to accidental fall and 62% of the cases were Muller type A and 38% were type C. For five patients MIPPO technique was followed. In our study in most of cases long working length was followed but in ten patients short working length was used but we had three implant failures among these cases.

Five patients had associated Hoffa fracture and eight patients had open fracture, out of which in three patients wound debridement and knee spanning external fixator was applied and surgery was delayed till wound healed well without residual infection and the patients who had associated Hoffa fracture the articular reconstruction was carried by 4mm

cancellous screws. Bone grafting was done for seven patients. The shortest follow up period was 3 months and longest period was 12 months. Complications included postoperative knee stiffness in 40% of the patients and 7.5% of the cases got infected. There were three cases of implant failure in our study. Limb length discrepancy in the form of shortening less than 2.5cm was seen in three patients. In this study by the analysis of the results using the Neer's [9] rating criteria, taking into criteria as pain, knee range of motion, angulation and functional ability, there were 7 cases with excellent results, 22 cases with good results, 6 cases with fair result and 5 cases with poor results. We compared our study with other studies throughout the world then following result were obtained as shown in table. The good outcome seen in our study can be attributed to more of Type A fractures, which usually show favourable results. In our study, the mean time for radiological union was 14 weeks. (Range 12-15 weeks) which is comparable to study of LCP by Kayali *et al*. [10] in 2005, which averages 15 weeks. Overall results were excellent in 7 out of 40 cases and were satisfactory in remaining cases except seven. We had 72% good to excellent outcome as per Neer Score which is comparable to other studies.

Comparison of my Study with Another Study

Study Series	Year	Number of Fracture	% Of open fracture	% Nonunion	% Delayed union	% Needing bone graft	% Hardware failure	Avg. Healing time	Avg. Follow up
Schandelmaier *et al*. [11]	2001	54	19	2	6	11	9	13	6
Kregor *et al*. [12]	2004	30	47	0	3	20	20	12	20
Schutz *et al*. [13]	2005	52	32	4	12	19	6	13	12
Vallier *et al*. [14]	2006	46	54	0	15	30	13	14	12
Kayali *et al*. [10]	2007	27	26	0		4	7	15	16
Henderson *et al*. [15]	2011	70	26	30		13	8	12	30
Our Study	2018	40	25	2.5	10	15	7.5	14	12

Conclusion

Locking compression plate in distal femoral fractures promote early radiological union, good knee range of motion, decreased post-operative hospital stay, with lesser infection rate as there is minimal soft tissue dissection. However, accurate positioning and fixation are required to produce satisfactory results. Finally, it can be concluded that the use of LCP provides good functional and radiological outcome in distal femur fractures.

References

1. Krettek C, Schandelmaier P, Miclau T, Bertram R, Holmes W, Tsc H. "Transarticular joint reconstruction and indirect plate osteosynthesis for complex distal supracondylar femoral fractures, "Injury 1997;28(1):31-41,
2. Kolmert TL, Wulff Epidemiology and treatment of distal femoral fractures in adults.Acta Orthop Scand 1982;53(6):957-62.
3. Court -Brown CM, Caeser B Epidemiology of adult fractures: a review. Injiry 2006;37:691-7
4. Thomas P, Reudi, Richard E Buckley, Christopher G, Moran AO. Principles of Fracture Management. 2nd edition. Switzerland: A O Publishing 2007.
5. Martinet O, Cordey J, Harder Y, Maier A, Buhler M, Barraud GE. Epidemiology of Fracture of Distal Femur. Injury 2000;31:62-63.
6. Cory A Collne, Donald A Wiss. Rockwood and Green Fracture in adults. 7th edition. Philadelphia: LWW 2009.
7. Wilson JN. Watson Jone's: Fractures and joint injuries. 6th ed, 1982, 1003-070,
8. Charnley John. The closed treatment of common fractures. 3rded, 197-204.
9. Stover M. Distal femoral fractures: Current Treatment, Results and Problems. Injury 2001;32(3):3-13.
10. Kayali C, Agus H, Turgut A. Successful results of minimally invasive surgery for comminuted supracondylar femoral fractures with LISS:comparative study of multiply injured and isolated femoral fractures Orthop Sci 2007;12(5):458-65
11. Schandelmaier P, Partenheimer A, Koenemann B, Grun OA, Krettek C. Distal femoral fractures and LISS stabilization.Injury 2001;32(Suppl 3):SC 55-63.
12. Kregor P, Stannard JA, Zlowodzki M, Cole PA.Treatment of distal femur fractures using the less invasive stabilization system: surgical experience and early clinical results in 103 fractures.J Orthop Trauma 2004;18(8):509-20.
13. Schutz M, Muller M, Regazzoni P, Hontzsch D, Krettek C, Van der Werken C, Haas N. Use of the less invasive stabilization system (LISS) in patients with distal femoral (AO33) fractures: a prospective multicenter study. Arch Orthop Trauma Surg 2005; 125(2):102-8
14. Vallier HA, Hennessey TA, Sontich JK, Patterson BM.Failure of LCP condylar plate fixation in the distal part of the femur. A report of six cases Bone Joint Surg Am 2006; 88(4):846-53
15. Henderson CE, Kuhl LL, Fitzpatrick DC, Marsh JL. Locking plates for distal femur fractures: is there a problem with fracture healing? J Orthop Trauma 2011;25(1):S8-14.