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DISTAL FEMUR FRACTURES TREATED WITH MIPPO LOCKING COMPRESSION PLATE TECHNIQUE:- A PROSPECTIVE STUDY

H.K. Mali¹, D.R. Galfat², Himanshu Khichar³

¹ - Assistant Professor, Department of Orthopedics, RKDF Medical College & RC, Bhopal

² - Professor, Department of Orthopedics & Director Academics, PIMS, Udaipur

³ - Assistant Professor, Department of Orthopedics, PIMS, Udaipur

Corresponding Author

Dr. D. R. Galfat

Professor,

Department of Orthopedics & Director Academics,

PIMS, Udaipur

Email – drgalfat@gmail.com

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Abstract

Distal Femur fractures are complex injuries & great challenge to Orthopedic surgeon. These injuries have potential to leave behind long term disabilities particularly when the fracture is comminuted & extensive articular damage is present.

Aim of this study is to evaluate the functional outcomes of Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO) for distal femur fractures. In the present Prospective Study 21 Patients with distal femur fractures in adults were managed by using Locking Compression Plate & MIPPO technique. This study was conducted in multi centre tertiary care hospitals. 21 Patients (13 males & 8 females) ranging between age group 21 years to 62 years were included in the study. Rasmussen's Scoring system was used for evaluating the functional assessment, focused on clinical and radiological parameters. In Rasmussen's Scoring system there are scoring points for subjective complaints, Clinical signs, available range of motion & stability. The analysis was done in terms of gender, age group, mode of injury, frequency and type of injury, surgical intervention and complications. Majority of the injured patients were Male (61.9 %). Among male patients in 74.5% injury was due to domestic fall. Common age group was found to be 41 to 60 years accounting for 39%. All fractures in our patients got united and average union time was about 16 weeks with the range of 12 to 20 weeks. Of 21 patients only one

patient had restriction of range of movement of about 70 degrees and all the other patients had range of movement 110-130 degrees.

One patient had limb shortening of 10 mm. Functional outcome was assessed using Rasmussen's Scoring and we excellent and good results in 15 patients (71.4%) and 6 patients (28.6%) respectively. No poor results were found in our study. MIPPO is an excellent option and reproducible technique in treating the distal femur fractures of both intra-articular and extra-articular types. Complications associated with this technique can be minimised by mastering the surgical procedure and sound knowledge about the complex anatomy of distal femur.

Keywords: MIPPO, Rasmussen's Scoring system, Locking Compression Plate.

Introduction

Incidence of distal femur fractures are about 0.37% of all fractures and approximately 4% to 7% of all femoral fractures.¹

Generally in younger individuals distal femur fractures are due to high energy trauma, whereas in elderly especially in women it occurs due to low energy trauma.² These fractures are known to produce long term disability for the patient.³ Fractures at lower end of femur and upper end of tibia are often difficult to treat and tend to relate with several complications.⁴ These fractures have potential to produce long term disability, especially when they are related with marked bone comminution, extensive articular cartilage damage and severe soft tissue injury.⁵ MIPPO has been widely used in the treatment of long bone fractures and it was introduced by Wenda et al⁶ and Ferouk et al⁷ and Krettek et al⁸.

It allows biological fracture healing by preserving the vascularity of majority of the bone fragments which will serve as a living bone graft during fracture healing. In MIPPO technique the plate is inserted by Percutaneous approach which minimizes soft tissue disruption, periosteal injury with preservation of the fracture biology of the bony fragments.^{9,10} MIPPO is a method that combines both principles of the biomechanical properties of the fixation and an optimum bone to implant contact with preservation of biology of healing.^{10,11} Our aim was to assess the functional outcome of MIPPO- Locking Compression Plate (LCP) technique for distal femur fractures.

Material And Methods

It is a multi centre study conducted at tertiary care hospitals during the

period of December 2017 to October 2018 with a minimum follow up of 6 months. 21 patients (13 Male and 8 female) between the age group from 21 to 61 years were included in the study. Patients who had sustained injury and diagnosed as supracondylar (distal 15 cm of the femur) and intercondylar (intraarticular) fractures were included in this study. Before starting the study informed consent was acquired from each of the patient and they were informed that their data pertaining to their treatment will be utilized for publication of research article. All the patients were operated within 7 days of the injury. MIPPO technique was used for all the patients. The functional outcome was assessed using the criteria given by Rasmussen for all the patients.

Exclusion Criteria

- 1) Patients with associated ipsilateral fracture
- 2) Pathological fractures
- 3) Patients presented after 1 week of injury

Surgical Technique

All patients were operated on fracture table with the fractured limb under traction and normal limb in lithotomy position under regional anaesthesia. A 4.5 mm Distal Femur LCP was used in all the patients. Fracture including articular surface was reduced anatomically by closed techniques and provisional fixation was done with 2.5 mm K-wires from medial to lateral. If articular reduction was not achieved satisfactory then through joystick method reduction was manipulated till satisfactory articular reduction was achieved. Then metaphyseal reduction with reference to anatomical alignment and rotation was achieved. Rotation was assessed

intraoperatively by observing the continuity of meta-diaphyseal cortical line under image intensifier. Then 4-5 cm oblique lateral incision was made through lateral approach for the distal femur. Extraperiosteal dissection was carried out using Cobb's elevator from distal to proximal. An appropriate size LCP to get 4-5 screws in both proximal and distal segments of the bone was chosen and was slid through the extraperiosteal plane across the fracture site and proximally plate was aligned through a separate 2-3 cm incision. Plate was fixed temporarily by K-wires both proximally and distally after obtaining satisfactory reduction, rotation and length. Any angulation or rotation was corrected at this stage using bone levers or other methods. Then fixation was carried out with cancellous and cortical Locking screws in distal fragment under image intensifier guidance in both anteroposterior and lateral views. Fixation with one cortical screw in proximal fragment near the fracture site cortical hole is done to bring the plate near the lateral bone surface and to correct mediolateral displacement if present. Rest of the diaphyseal fixation was done using percutaneous stab incisions over the corresponding screw holes under the image intensifier guidance. Wound closed in layers without drain and compressive dressing applied with long knee brace to support the limb. Gentle ROM exercises. Quadriceps strengthening exercises, ankle and toe mobilization exercises were initiated from 2nd post-operative day onwards. Patients were allowed to undertake non-weight bearing walking with the help of crutches or walker for the initial 6 weeks following which progressive weight bearing was allowed depending on the fracture pattern, strength of

fixation and radiological evaluation. All patients were followed up at 6 weeks, 12-16 weeks, 20-24 weeks and at 6th month. During each visit patients were assessed by Rasmussen's criteria apart from radiological assessment.

Results

Out of 21 patients 13 (61.9%) were male. Among the male patients 74.5% had injury due to road traffic accidents. Frequency of injury was greater on right side (71.4%). All the patients included were having closed type of fractures. Results were excellent in 15 (71.4%), good in 6 (28.6%) patients. No poor results were found in our study as per Rasmussen's criteria. (Table 1)

Table – 1 – Rasmussen's Clinical outcome

Rasmussen's Clinical scoring	No. of patients	Outcome
28	15 (71.4%)	Excellent
22	6 (28.6%)	Good
17	0 (0%)	Fair



Preoperative X-ray



Postoperative X-ray

Discussion

Fractures of distal femur pose a great challenge to Orthopaedic surgeon, especially when there is articular involvement. Several studies implies that operative management of distal femur fractures resulted in better functional outcome then non-operative treatment.¹¹⁻¹³ Studies conducted to compare open versus closed reduction with internal fixation revealed good and excellent results in ORIF group.^{13,14}

LCP is biomechanically stronger than conventional plates and can provide stability and compression and serves in dual mode called as hybrid construct. Many studies have been conducted to assess the effectiveness of locking implants in the treatment of distal femur fractures.¹⁵⁻¹⁷

Therefore MIPPO technique provides superior results compared with the conventional techniques, subject to condition it is executed in an appropriate manner. Many studies have been conducted to assess the effectiveness of locking implants in the treatment of distal femur fractures.

Our study showed excellent and good results with no significant complications. All the fractures got united in time without any delayed union or nonunion. Early full weight bearing was achieved in about 71% of cases with early union of fracture.

Conclusion

Minimally invasive Percutaneous plate osteosynthesis (MIPPO) is an effective and excellent option in treating the intraarticular and extraarticular fractures of distal femur without any significant complications, subject to the condition that surgeon possesses meticulous knowledge of MIPPO technique and principles of Locking Compression Plating

technique and complex anatomy of distal femur.

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