

OUTCOME OF DISTAL FEMORAL LOCKING PLATE IN SUPRACONDYLAR FRACTURE OF FEMUR MULLAR TYPE-A BY MIPO TECHNIQUE

Abdul Rauf,¹ Muhammad Zafar Iqbal,¹ Zuhair Bhatti,¹ Muhammad Tahir Shafi¹

ABSTRACT

Background: Supra condylar femoral fracture has to multiple treatment options and may have different complications including wound infection, delayed or nonunion and loss of knee motion. Distal femoral locking plate is a recent advance method of treatment as minimal invasive technique. **Objective:** To determine the outcome of locking plate in supracondylar fracture of distal femur by minimal invasive plate osteosynthesis, regarding union and range of motion at knee and hip joint. **Methodology:** This descriptive study was carried out in Orthopedics Department of Lahore General Hospital, Lahore on 35 patients from 1st January 2013 to December 2014. All the patients suffering from closed supra-condylar fractures of distal femur Muller Type-A presenting within 24 to 48 hours of injury between 20-50 years of age were included in the study. MIPO technique was used for surgical treatment in these cases. Union was assessed at follow up. Data was entered and analyzed by using SPSS version 20. **Results:** There were total 35 patients in this study; the mean age of the patients was 32.37±7.86 years. There were 26(74%) male and 9(26%) female. The mean hip flexion for operated limb was 124.91°±7.03 and the mean knee flexion for operated limb was 125.43°±10.56. At 36th week follow up all 35(100%) patients presented with grade-I radiological union i.e. formation of homogenous bone structure. **Conclusion:** Distal femoral locking plates resulted in favorable outcomes on short-term basis for treating supra-condyle fractures of distal femur Muller A in terms of union and range of motion at knee and hip joint. **Key Words:** Femur, Fracture, MIPO, Fluoroscopy, Supracondylar

INTRODUCTION

Femur being the longest and strongest bone in the body surrounded by heavy muscular nest,¹ frequently results in fractures of the distal femur.² Supra condylar part of femur is much weaker than the shaft of same bone accounting for variety of fracture patterns.³

The exact and ideal method of treatment is yet to be established. Condylar blade plate and dynamic condylar screw need good bone stock and are not suitable for osteoporotic fractures as minimal invasive methods became more attractive.⁴ Recently biological methods with soft tissue preservation and hematoma sparing have led to fewer rates of complications.⁵ Distal femoral locking plates are a recent advanced method of treatment as minimal invasive technique.^{6,7}

Locking distal plate is a recent treatment option to overcome this difficult develops complication situation but shorter length of plate, less number of screws and inadequate bridging can lead to failure.⁸ Locking distal femoral plate provides stable construct to avoid infection, nonunion and verus knee deformity encountered with other implants.⁹⁻¹³

The surgical technique that results in good outcome, must be meticulous and the biomechanical qualities of locking plate must be

understood to prevent different complications. The objective of this study was to determine the outcome of locking plate in supra-condylar fracture of distal femur by minimal invasive plate osteosynthesis (MIPO) regarding union and range of motion at knee and hip joint.

METHODOLOGY

This descriptive case series was carried out in Orthopedics Department of Lahore General Hospital, Lahore on 35 patients from 1st January 2013 to 31st December 2014 by calculating the sample size with convenient sampling formula keeping the confidence level equal to 95% and the margin of error equal to 10%. Each patient was followed up to nine months. All the patients suffering from closed supra-condylar fractures of distal femur Muller Type-A, presenting within 24 to 48 hours of injury, of age between 20-50 years were included in the study. All the patients with open fractures, poly-trauma, pathological fractures, fractures extending into articular surfaces and patient with previous surgery of limb were excluded from study. All the patients were received in the emergency department and initial resuscitation was done. All the patients were operated upon in the next available list in main operation theater. Pre-operative antibiotics Injection Cefazoline 1G I/V was given as prophylaxis. The

1. Department of Orthopaedics, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, University of Health Sciences Lahore, Pakistan.

Correspondence: Dr. Muhammad Zafar Iqbal, Department of Orthopaedics, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, Pakistan

Phone: +92-3009674969

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limb was anaesthetized with the help of spinal, epidural or general anesthesia. Tourniquet was applied around the thigh over adequate cotton padding to achieve clear bloodless field during surgery.

Maximum time for tourniquet application was no more than 90 minutes. The reduction was done under fluoroscopy. Under fluoroscopic guidance, a incision was given over the lateral aspect of the distal femur longitudinally at the level of the intercondylar notch. Fracture was reduced under image intensifier guidance. Following reduction, plates (with 6 to 12 holes) were slid in a distal-to-proximal direction over the lateral aspect of the distal femur. The length of the plate was determined intra-operatively after reduction. At least 3 screws use applied sparing joint line. Postoperatively, the operated limb was kept elevated on a splint. Active hip and knee mobilization and static quadriceps exercises were allowed at postoperative day 1. Full weight bearing was not permitted until consolidation of the fracture site. Patients were followed up for the next 9 months for achievement of normal weight bearing. Age, sex was noted and informed consent was taken. The patients were discharged next day after surgery. The follow up of the patients was done at 1st post operative day, 2nd, 3rd, 4th weeks and at 6 week interval up to 9 months. The patients were assessed for the outcome parameters union and range of motion. All the information was collected on a specially designed Performa.

All the collected data was entered into SPSS version 20 and analyzed. Quantitative data like age (in years), time of union (in days) and range of motion for knee and hip was presented as means and standard deviations.

RESULTS

There were total 35 patients in this study, the mean age of the patients was 32.37 ± 7.86 years, the minimum age was 20 years and maximum age was 48 years. Gender distribution of patients showed that there were 26(74%) males and 9(26%) females in the study. The mean hip flexion for normal limb was 133.86 ± 2.13 , with range 130-135° The mean hip flexion for operated limb was 124.91 ± 7.03 , with range of 100-130° The mean knee flexion for normal limb was 135 ± 0 , with range of 135-135°. The mean knee flexion for operated limb was 125.43 ± 10.56 , with range of 90°-130° The mean hip extension for normal limb

was 34.86 ± 10 ° with range of 25°-90°. The mean hip extension for normal limb was 28.06 ± 10.90 , with range of 20-87°. The mean knee extension for normal limb was 0 ± 0 , with range of 0°-0°. The mean knee extension for operated limb was 0 ± 0 , with range of 0°-0°. At 36th week follow up all 35(100%) patients presented with grade-I radiological union i.e. formation of homogenous bone structure.

Table I: Radiological union according to the hammer classification at 36th week follow up

		Healing	Percentage
36 th Week Follow up Hammer classification	Grade-I	35	100%
	Grade-II	0	0%
	Grade-III	0	0%
	Grade-IV	0	0%
	Grade-V	0	0%
Total		35	100%

DISCUSSION

There were 74% males and 26% females in the present study and comparable with another study conducted in 2014 where 70% of the patients treated were males and 30% were females.¹⁴ In the present series maximum age was 48 years but in most of the series conducted internationally older patients were treated with buttress or locking plate.^{4,13} Union was achieved in 100 % of patients in this study and in a study union in all 23 patients enrolled positively.¹⁴ The average range of motion at knee was 125 degree in the present study while in another study 106 degree knee flexion was achieved in all closed fractures stabilized with locking compression plates after a follow-up of minimum one year.¹⁵ No infection was detected in current study but in a study conducted in 2016, 4% of the total 50 patients suffered from superficial infection and 2% of the patients developed deep infection.¹⁶

A comparative study on 57 patients was conducted recently about supra-condylar nailing and distal femur locking plate which showed more complications in nailing group and union within 14 weeks in plating group with insignificant difference between both procedures on short-term basis.¹⁷ However, both techniques need detailed preoperative workup, expertise and long learning curve to be successful and helpful. Earlier studies were not favorable regarding callus formation with locking plates.¹⁸ Autogenous bone grafts are commonly used to fill the traumatic bone defects and non-unions. Similarly locking plates are such a strong and stable constructs that relative gap nonunion and implant failure are common complications needing primary

bone grafts reported on short-term basis.¹⁹ A study conducted in 2014 recommended secondary bone grafting to overcome the risk of nonunion experimented in two patients.²⁰ Some studies showed good outcome by using locking compression plate (LCP) distal femur fractures.²¹⁻²⁴

CONCLUSION

The Minimal Invasive Plate Osteosynthesis (MIPO) technique combined with distal femur locking plates resulted in favorable outcomes on short-term basis for treating supra-condylar fracture of distal femur Muller A, in terms of union and range of motion at knee and hip joint.

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