

Medial distal femur fixation with proximal tibial locking plate: A case series

Kamarul Izham Kamarudin¹, Nur Dini Mohd Yusof², Suresh Chopra³

Abstract

Open reduction and internal fixation using conventional lateral distal femur locking plate is a standard operative method for distal femur fracture. This case series describes medial plating of distal femur fracture using proximal tibia locking plate that is anatomically fit to the medial aspect of distal femur, by the minimally invasive plate osteosynthesis (MIPO) technique which gives a stable construct with good outcome.

IeJSME 2017 11(3): 32-34

Keywords: Distal femur, medial plating, proximal tibia locking plate

Introduction

Distal femur fracture has been treated with skeletal traction historically but healed with morbidity and mortality. Nowadays, operative fixation is a gold standard treatment. There are multiple stabilisation modalities that are available, such as single lateral buttress plate, fixed angled plate, intramedullary nail, medial and lateral locking plate, hybrid external fixation or even a primary total knee arthroplasty.¹ Generally lateral plating is used for a comminuted fracture of the

distal femur. However, Nikolai *et al* in his biomechanical analysis, comparing the stability of medial versus lateral plating in axial loading for comminuted supracondylar femur fracture, found that medial plating is stronger and stiffer compared to lateral plating.² In We present a case series of comminuted supracondylar femur fractures that are successfully treated with medial plating using proximal tibia locking plate by the MIPO technique.

Case Presentations

Case 1

A 17 years-old boy alleged road traffic accident sustained multiple limbs fracture including open supracondylar fracture of left femur with intercondylar split (Gustilo 3A). He underwent two stages surgery; first stage was wound debridement and exploration with intercondylar screw fixation and tibial pin insertion. Five days later medial plating of distal femur using proximal tibia locking plate by MIPO technique was done after wound cleaning. Postoperatively uncomplicated. After three months, fracture was well united. Patient was on full weight bearing with full motion of the knee. He also sustained posterolateral complex injury of the knee, that required him for removal of implant, for further investigation and ligament reconstruction later.

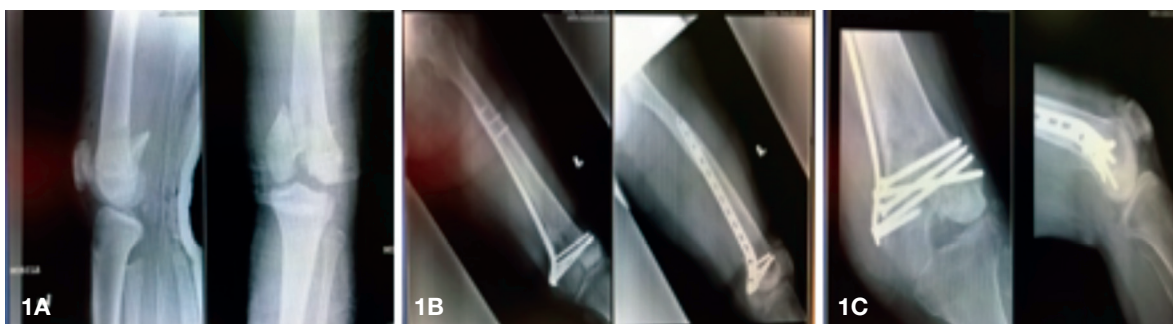


Figure 1: A – preoperative radiograph; B – Day 1 post-operative; C – At 3 months

¹Department of Orthopaedic, Hospital Tuanku Jaafar, 70300 Seremban, Negeri Sembilan, MALAYSIA

²Department of Orthopaedic, Hospital Universiti Kebangsaan Malaysia, 56000 Wilayah Persekutuan Kuala Lumpur, MALAYSIA

³Department of Orthopaedic, Hospital Sultanah Bahiyah, 05460 Alor Setar, Kedah, MALAYSIA

Address for Correspondence:

Dr Kamarul Izham bin Kamarudin, Hospital Tuanku Jaafar, Seremban, Jalan Rasah, Bukit Rasah, 70300 Seremban, Negeri Sembilan, MALAYSIA
Email: drizham75@gmail.com

Case 2

A 79 years-old man alleged road traffic accident while driving his car. He complained of left knee pain and was unable to bear weight. Physical examination revealed swollen, tender right knee with extensive ecchymosis. Radiographs showed displaced supracondylar fracture of left femur with involvement of medial condyle fracture

and intercondylar extension. Limb was splinted with cast and elevated on Bohler Brown Frame. Cold compression with cryotherapy was applied. Medial plating was done to the distal femur by the MIPO technique at day ten of injury, after the soft tissue condition subsided. Fracture healing was achieved six months later with good knee motion.



Figure 2: A – preoperative radiograph; B – Day 3 post-operative; C – At 6 months

Case 3

A 58 years-old lady with multiple comorbidities, alleged fall at home. She presented to the emergency department with left thigh pain and was unable to walk. Five days later, she underwent medial plating for closed supracondylar fracture of left femur using proximal tibia

locking plate by MIPO technique. Postoperative was uneventful and the patient was discharged home with walking frame ambulation 3 days after the surgery. Nine months later, she was able to walk unaided without pain. Knee motion was full and surgical wound well healed.



Figure 3: A – preoperative radiograph; B – 3weeks post-operative; C – At 9 months

Discussion

Open reduction and internal fixation is the treatment of choice for comminuted supracondylar fractures of the distal femur. Multiple fixation technique such as conventional plating, external fixators and, recently, low-profile contoured dynamic compression locking plating systems have been utilised to achieve angular stability and compression at the tension site. Fracture stabilisation aims for mechanical stability together with protecting the biological environment of damaged bone and surrounding tissue, thereby optimising the healing environment.

The biomechanical study by Nikolai *et al* demonstrates that a medial plate placed is a more stable construct for medial comminution with the lateral cortex in contact to share load.² Anatomical reduction without biological disruption in metaphyseal comminuted fractures is rarely possible, therefore mechanical stability is crucial for fracture union. Single lateral plating supports the medial column comminution indirectly and leads to accumulation of stress concentration on the medial side. This leads to the failure of fixation, plate breakage, screw pull out and varus collapse.

Lateral plating increases the moment arm and hence increases the deformation force. Lateral plate is more likely to undergo plastic deformation, resulting in earlier failure of the bone-plate construct. Conversely, with the medial plate, the moment arm is smaller, and thus, deformation and plate strains would be lower. Medial plating supports the deficient medial column directly and acts like a buttress on axial loading, resulting in a stiffer stronger construct. In this study, the proximal

tibia locking plate is an excellent choice to achieve the buttress effect because it can fit anatomically with the medial femur.

Krettek *et al* introduced a percutaneous plating technique called minimally invasive plate osteosynthesis (MIPO).⁵ This technique uses indirect reduction, which minimises direct exposure and muscle stripping. This concept is useful in comminuted articular or metaphyseal fracture. It gives lower infection rate, less blood loss and promotes early mobilisation and better wound healing.

Conclusion

Medial plating of distal femur using proximal tibial locking plate by the MIPO technique is mechanically stronger and stiffer, with favourable biological fixation and good functional outcome.

REFERENCES

1. Jazrawi LM, Kummer FJ, Simon JA, Bai B, Hunt SA, Egol KA, Koval KJ. New technique for treatment of unstable distal femur fractures by locked double-plating: case report and biomechanical evaluation. *J Trauma* 2000; 48(1) 87-92.
2. Nikolai B, Raju K, Joshua J, Arshad K. Comminuted supracondylar femoral fractures: A biomechanical analysis comparing the stability of medial versus lateral plating in axial loading. *Strat Trauma Limb Reconstruction* 2016; 11(3): 187-91. DOI 10.1007/s11751-016-0268-0
3. Jang SA, Byun YS, Han IH, Shin D. Medial Plating of Distal Femoral Fracture with Locking Compression Plate-Proximal Lateral Tibia: Cases' Report. *J Korean Fracture Soc* 2016; 29(3): 206-12.
4. Luís Eduardo Passarelli Tírico *et al*. Medial closing wedge Distal Femoral Osteotomy: Fixation with Proximal Tibial Locking Plate. *Arthrosc Tech* 2015; 4(6): e687-e695.
5. Krettek C, Schandelmaier P, Miclau T, Tschernke H. Minimally invasive percutaneous plate osteosynthesis using the DCS in proximal and distal femoral fractures. *Injury* 1997; 28 (Suppl 1): A20-30.