

Treatment of Supracondylar Fracture of Distal Femur with Condylar Locking Compression Plating

Tapi Nalo¹, Amit Agrahari², Snehasish Datta³, Vinil Paul⁴, S. Nongthon Singh⁵, Roel Langshong⁶

^{1, 2, 3, 4, 5, 6}[Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India]

Abstract: ***Aim:** To know the outcomes of condylar locking compression plating in treatment of supracondylar fracture of distal femur in Regional Institute of Medical Science, Manipur, Imphal, India. **Introduction:** Distal femur (supracondylar and intercondylar) fractures occur at approximately one-tenth the rate of proximal femur fractures and make up to 6% of all femur fractures. There is a bimodal distribution of fractures based on age and gender. **Material and Methods:** In Regional Institute of Medical Sciences, Imphal, Manipur, thirty consecutive patients with supracondylar fracture of distal femur treated with condylar locking compression plating with follow up period of 6 months. **Results:** Based on the assessment parameters (Neers Score) used in this study, 25 patients (83.33%) had excellent, 3 patients (13.33%) had good outcome and 1 fair (3.33%) in the final result. **Conclusion:** Locking compression plate fixation with minimal periosteum and vascular traumatization, is a safe procedure for complex distal third femoral fractures. With an excellent functional outcome, early clinical and radiological union and it can be done on a routine basis with a minimum of complications.*

Keywords: Supracondylar fracture of femur, Condylar locking compression plate, Extra medullary load bearing device, Neers score, Early bony union.

1. Introduction

The femur is the largest tubular bone in the body connecting between Tibia and Pelvic bone. It is surrounded by the largest mass of muscles, having three portions as proximal, middle and distal third.⁽¹⁾ The distal femur (supracondylar and intercondylar) comprises the distal 10 to 15 cms of the femur.⁽¹⁾ (Pic 2). Femur is almost cylindrical in most of its length and bowed with a forward convexity.⁽²⁾ It is narrowest in the mid shaft, expands a little as it is traced upward and widens appreciably near the lower end of the bone.⁽³⁾

Supracondylar fractures of femur is a catastrophic event with an age and gender-related bimodal distribution and occur most frequently in young men after high-energy trauma and in elderly women after a low-energy fall.^(1,3) The most common causes of such severe trauma are road traffic accidents (RTA), falls from height and gunshot injuries. The incidence is on the rise because of increasing vehicular accidents and rapid urbanization.

2. Surgical Anatomy

The femur is surrounded by thick muscles of the thigh enclosed in fascia lata, a tough sheath of dense fibrous tissue which is attached to the inguinal ligament anteriorly; the iliac crest laterally, the gluteal fascia posteriorly and continues with the deep fascia of the leg. The thickened portion of this fascia forms the iliotibial band on which the Gluteus maximus and tensor fascia lata are inserted. The muscles of the thigh are compartmentalized into anterior, medial and posterior groups by thick bands of fibrous tissues that extend from the fascia lata down to the linea aspera on the posterior aspect of the femoral shaft.

The muscles in the posterior compartment⁽²⁾ are the biceps femoris, the semimembranosus and the semitendinosus, collectively called the hamstring muscles. The muscles of the anterior compartment⁽²⁾ are formed by the four parts of the quadriceps which extends the hip and the medial

compartment⁽²⁾ is formed by the adductor group of muscles and the gracilis which adducts the thigh on the hip.

3. Materials And Methods

The study will be conducted in the department of Orthopaedics, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, for a period of two years from September 2012 to August 2014. This is a prospective study in which at least thirty (30) consecutive cases of supracondylar fracture of femur, aged 18-70 years, irrespective of sex, will be subjected to condylarlocking compression plate fixation after obtaining written informed consent.

4. Operative and Surgical Technique

Patients were positioned in supine slightly elevating the affected parts with a sandbag on lateral position. Skin was prepared by povidone iodine (10% v/v) solution and spirit and the operating field from the buttock to the knee was draped. Fracture site was approached through a lateral incision. After skin incision splitting of muscle in layers till the fracture site was exposed. Both the fracture fragments were reamed. Reduction of fracture by open reduction was done and maintained by bone clamps.

The appropriate chosen sized plate (pic 1) was placed into position and stabilized with bone clamp or reduction forceps (pic 4). Then rigid fixation was achieved by insertion of variable numbers of locking screws which was inserted after drilling the bone through the plate and bone surface by motorized power drill or hand-drill. The skin wounds were closed over a negative suction drain after thorough washing with copious amount of sterile saline solution and sterile dressings applied over the limb. The operated limb was kept elevated with both the hip and knee partially flexed. During this time passive and active movements of the toes were encouraged. Patients received parenteral third generation cephalosporin for seven days which was then changed to

appropriate oral formulation from the eight day and continued for another seven days. Anti-inflammatory analgesics and other supportive measures were also given as per individual requirements. The suction drain was removed after 48 hrs and check X-ray (AP/Lat) of the limb was taken (pic 5). Patients were allowed to sit out of bed once the drain was removed. Active and passive movements of the limb was started and continued from immediate post-operative day. Skin sutures were removed on the tenth post-operative day and patients were discharged.

5. Results and Discussion

Thirty adult patients of supracondylar fractures of femur were subjected to open reduction and internal fixation (ORIF) using condylar locking compression plate between September 2012 and August 2014, in the department of Orthopaedics, RIMS, Imphal. Patients were followed 3 weeks for the first twelve month after surgery, then once a month the next three (3) months and then every three (3) months for period of one year in the out-patient department of Orthopaedics, RIMS. The maximum age of the patient in the present study was 70 years and minimum being 18 years, with mean age of 27.50 years. The supracondylar fractures of femur show male preponderance (table 1). The mean time to operation for closed fracture was 8.96 ± 3.2 days (7-14) days and mean time to operation for open fracture was 11.20 ± 3.88 days (7-14) days. Stainless steel plates of 8 holed in 14 (46.6%), 9 holed in 8 (26.6%) and 10 holed in 8 (26.6%) patients were used. The mean duration of hospitalisation for all patients was 18.77 days (range, 14 – 29 days). Clinical union was seen at a mean time of 14.47 weeks (range, 9 – 32 weeks). Radiological union was considered to be established when there was radiological obliteration of the fracture line with bridging callus using Schmit's criteria. Radiologically, bridging callus was seen at 12-16 post-operative weeks and the mean time to complete radiological union was 26.47 weeks (range, 20 – 40 weeks) (table 2). There were no intra-operative and immediate post-operative complications. Two case of superficial infection was managed by antibiotics and local wound dressing. Based on the assessment criteria (Neers scoring system) for the present study, the final outcome for all cases was Excellent in 25 (83.33%), good in 3 (13.33%) and fair in 1 (3.33%) patients (table 3).

6. Conclusion

Locking compression plate acts as an extra-medullary load bearing device, stabilizing fracture fragments and ensuring early bony union. The locked plate-screw system produces a rigid screw-bone fixation which prevents malrotation or shortening. Early return of joint functions and weight bearing is easily achieved concurrent with fracture healing. Though not an ideal procedure as far as operative scar is concern, an open compression plate fixation with minimal periosteum and vascular traumatization, locking compression plating is a safe procedure for complex distal third femoral fractures. With an excellent functional outcome, early clinical and radiological union, it can be done on a routine basis with a minimum of complications.

Table 1: Showing age and sex distribution of the patients

Age range	Male	Female	Percentage (n=30)
18-20 yrs	2	1	10%
21-30 yrs.	16	2	60%
31-40 yrs	3	1	13.33%
41-50 yrs	0	1	3.33%
51-60 yrs	1	1	6.66%
61-70 yrs	1	1	6.66%
Total	23	07	100

Table 7: Showing time of clinical and radiological bony union (in weeks)

Type of Union	Duration to union (weeks)	Mean duration to union (weeks)
Clinical union	9-32	14.47
Radiological	20-40	26.47

Table 8: Showing final result of this study

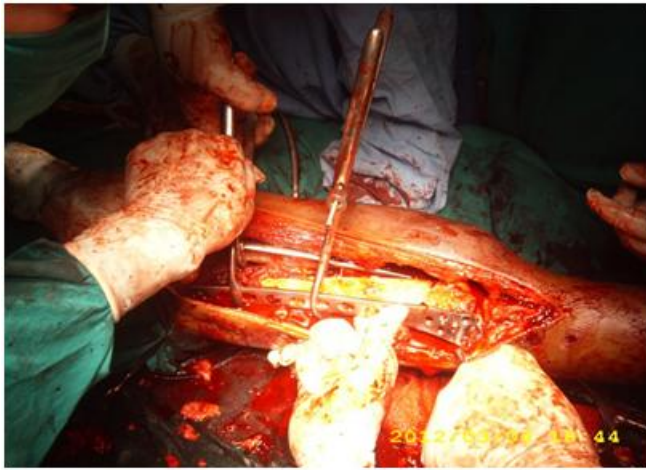
Outcome	No. Of patients	Percentage % (n=30)
Excellent	25	83.33
Good	4	13.33
Fair	1	3.33
Total	30	100



Pic 1: Instruments and Implant



Pic 2: Preoperative x-ray



Pic 4: Plate Placement



Pic 5: Postoperative x-ray

Dr. Snehasish Datta, Post-graduate trainee, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India.

Dr. Vinil Paul, Post-graduate trainee, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India.

Dr. S Nongthon Singh, Professor and head of Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India.

Dr. Roel Langshong, Registrar, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India.

References

- [1] Koval KJ, Zuckerman JD. Handbook of fractures. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2006.
- [2] Dalley AF II. Frank H Netter's Atlas of human anatomy. 2nd ed. East Hanover: Novartis; 1996.
- [3] Bucholz RW, Jones A. Current Concepts Review: Fractures of the Shaft of the Femur. J Bone Joint Surg Am 1991; 73:1561-66.
- [4] Wiss DA, Brien WW, Stetson WB. Interlocked nailing for treatment of segmental fractures of the femur. J Bone Joint Surg Am 1990; 72:724-28.

Author Profile



Dr. Tapi Nalo has passed MBBS IN 2002 from Medical College, Kottayam. He is Post-graduate trainee, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India.

Dr. Amit Agrahari, Post-graduate trainee, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India