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Research Paper

Study of Operative Results of Complex Fractures of Distal End Femur Treated by Locking Plates

Medical Science

KEYWORDS : Distal femur fracture, Locking Plate, DFLP, Difficult reduction

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ABSTRACT

Distal femur fractures for years have remained an unsolved problem in orthopedic trauma. The introduction of distal femur locking plate based on the internal fixator principle has been a welcome change that has brought about a drastic change in the management of these fractures. We present our experience with distal femur locking plate in the managemen of distalfemurfractures .

We have done a retrospective study of 40 patients with distal end femur fractures operated during the period of 2009 to 2013 at our institute. There were 30 males and 10 females with maximum number of patients in more than 20age group. The mode of injury was RTA 90%and falls 10.there were closed fracture 55% and open fracture 45%.The fractures were classifiedas A3 (20%), C1(15%), C2 (27.5%), C3 (37.5%). Thetime interval between injury and surgery was 2 days .. The ROM at the end of the follow-up period was 120° in 50% of our patients

The use of DFLPin fractures of distal femur in our study seems to be associated with a good functional outcome and early recovery as it provides for early mobilization and rehabilitation and is associated with good results. DFLP is definitely helpful in those comminuted C3 fractures which were earlier associated with poor results when other implants were used. The use of DFLKP in these conditions results in improved outcomes.

AIMS & OBJECTIVES

Aim of the study is to analyze retrospectively the operative results of complex Distal end Femur Fractures by Distal Femoral Locking Plates

INTRODUCTION

Fracture of the distal femur are complex injuries that can be difficult to manage. These serious injuries have a potential to produce significant disability.Distal femur fractures are much less common than hip fractures and account for about 7% all femur fractures. If fractures of hip are excluded,31% of femur fractures involve in the distal portional

MECHANISM OF INJURY4

Most supra-condylar fractures are the result of severe varus, valgus, or rotational force with axial loading. In young patients, this amount of force is typically the result of high energy trauma such motor-vehicle accidents and falls from heights. In elderly patients, the force from a minor slip and fall on a flexed knee may be sufficient to produce these fractures.

AO/OTA Classification

A. Extraarticular

A1. Simple (two part)
A2. Metaphyseal wedge
A3. Metaphyseal complex (communited)

B. Partial articular (unicondylar)

B1. Lateral condyle (fracture in the sagittal plane)
B2. Medial condyle (fracture in the sagittal plane)
B3. Frontal (fracture in the coronal plane)

C. Complete articular (bicondylar)

C1. Articular simple and metaphyseal simple (a T or Y fracture pattern)
C2. Articular simple and metaphyseal multifragmentary
C3. Multifragmentary articular

MATERIALS AND METHODS

We have done a retrospective study of 40 patients with distal end femur fractures operated during the period of 2009 to 2013 at our institute. All the injuries were attended immediately and patient was haemodynamically stabilized. The wounds, if any, were washed with H_2O_2 betadine and then saline under aseptic precautions and sterile dressing kept. Distal neurovascular status was assessed and other Injuries like abdominal or head injuries are addressed immediately.

Distal end femur fractures were immobilized with above knee slab and skeletal traction with upper tibial pins and traction over bohler frame. Patient was investigated for blood-chemistry, radiologically in form of roentgenograms (AP and LATERAL views of involved part plus routine trauma series), ultrasound and CAT Scan, if indicated.

We included in our study:

- All patients with fracture of distal 9-15 cm of femur.

We excluded from our study

- Conservatively treated patients.
- Patients treated with any other modality than extramedullary fixation with plates or intramedullary fixation with nails. and Pathological fractures.

A 25 years old male patient with H/O RTA had closed type C3 # S/C Femur operated by open method by 9 hole DFLP united at 6 months with full range of motion and squatting and cross legged sitting possible.

Implant Use(Distal femoral locking plates)

The locking distal femoral plate is an example of a device that combines fixed angle locking screw technology with the option for conventional screw utilization. It is a pre contoured plate

with distal expanded part having multiple holes which allow placement of 4.5 mm cortical and 5.0 mm cancellous screw with locking head. Proximal part has holes which allow placement of either of locking or simple 4.5 mm cortical screw.

- This plate has an advantage of useful in osteoporotic patients. Locking screws prevent varus/valgus collapse. As the plate is not compressed against a cortex and therefore periosteal blood supply may be preserved and so have a possible biological advantage over other plates. Again the provisional fixation has to be perfect and also bone quality cannot be judged

➢ **LATERAL APPROACH TO DISTAL FEMUR**

- **Skin Incision**

We begin the skin incision in the mid-lateral line of the femoral shaft and curve it anteriorly over the lateral femoral condyle, towards the tibial tubercle.

The need for a distal extension of the skin incision depends on whether or not an arthrotomy needs to be performed. If joint visualization is required, the incision is carried to the level of the tibial tubercle (dashed line). .

- **Division of the iliotibial band**

Divide the iliotibial band (tract) in line with the skin incision. Distally, the fibers slope anteriorly towards the tibial tubercle.

- **Elevation of vastus lateralis**

The muscle fibers of the vastus lateralis are minimal in the distal 8-10 cm of the femur. Incise the muscle fascia investing the vastus lateralis just anterior to the lateral intermuscular septum and elevate the muscle fibers off the septum, working from distal to proximal.

Retract the vastus lateralis anteromedially. Several perforating vessels of the profunda femoris artery and vein have to be ligated.

For cases in which the articular surface needs to be exposed (B- or C-type fractures), perform a joint capsule arthrotomy.

- **Definitive procedure :**

This approach is used to reduce the fracture and placing any ofthe plating device.

- **Wound closure**

We close any joint capsule arthrotomy facia and iliotibial tract subcutaneous tissue with absorbable sutures (vicyl no.1). Close the skin and Suction drains are placed.

➢ **Observation and discussion**

Patients (40) who satisfied the inclusion criteria wereincluded in the study. There were 30 males and 10 females with maximum number of patients in more than 20age group The mode of injury was RTA 90%and falls 10.there were closed fracture 55% and open fracture 45%.The fractures were classifiedas A3 (20%), C1(15%), C2 (27.5%), C3 (37.5%). Thetime interval between injury and surgery was 2 days .. The ROM at the end of the follow-up period was 120° in 50% of our patients . The knee score evaluated at the end ofthe follow-up below in table

Union time	NO. OF PATIENTS	PERCENTAGE
<6 MONTHS	27	67.5%
6-12 MONTHS	11	27.5%
>12 MONTHS	2	5%
TOTAL	40	100%

Final Outcome By Tegner Lysholm Score

OUTCOME	NO. OF PATIENTS	PERCENTAGE
EXCELLENT(>90)	17	42.5%
GOOD(84-90)	6	15%
FAIR(65-83)	9	22.5%
POOR(<65)	8	20%
TOTAL	40	100%

➢ **Conclusion**

In a locking plate system, bone healing is achieved indirectly by callus formation because stability is maintained at the angular stable screw-plate interface. The combination holes in the LCP are for placing compression screws in the diaphyseal fragment. This is done after achieving fracture reduction and placing locking screws in the metaphyseal fragment. This was especially useful inpatients with simple fractures (type A1). The bridging principle is particularly useful for comminuted fractures (AO type A3) when a minimally invasive approach is used. It preserves the fracture hematoma and reduces the need for bone grafting. Locking screw-plate constructs are stronger than blade-plate systems in both cyclic loading and ultimate strength in biomechanical testing of simulated A3 distal femoral fractures.

In this study good results were achieved in distal femoral fractures. The reasons could be surgeon's familiarity with the procedure leading to shorter operative times, decreased time between injury and surgery and the use of a locking compression plate as the implant of choice in distal femoral fractures. However there were certain limitations also. The improved outcomes seen in our study can be because of the absence of poor prognostic factors like open injuries. One significant limitation was that the sample size was less and that we could only follow up the patients for a limited period of time.

Key Points

- The use of LCP in fractures of distal femur in our study seems to be associated with a good functional outcome and early recovery.
- In this study the objective was to assess the effectiveness of LCP in the management of distal femur fractures.
- LCP represents a valuable addition to the orthopedician's armamentarium. It provides for early mobilization and rehabilitation and is associated with good results.
- LCP is definitely helpful in those comminuted C3 fractures which were earlier associated with poor results when other implants were used.