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The Role of Distal Femoral Locking Compression Plate in the Management of Fractures of The Distal End of Femur

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Abstract

Background: Fractures of distal end of femur present a huge surgical challenge.The aim of this study is to evaluate functional, outcome, fracture healing, and the complications of distal femoral fractures using distal femoral locking compression plates. Materials and Methods: We reviewed 30 cases of supracondylar and intercondylar fractures of femur were treated with Distal femoral locking compression plates between 2013 to 2015. There were 18 men and 12 women with mean age of 28 years .More than half of the patients were road traffic accident some are fall from height and injury due to slip. Results: The mean follow-up period was 18 months (range 12–20). The mean time for radiological union was11.6 weeks (range 10–16). At the latest follow up ROM>130° is noted in 15 patients, >110° in 10 patients, and 90°-110 ° in 3 patients. 20 patients (66.66%) had excellent and 6 patients had good outcome. Conclusion: It was concluded that distal femoral locking compression plate is an effective and technically undemanding method for treatment of supracondylar and intercondylar fractures of femur.

Key ward: Distal femoral locking compression plate, Distal End of Femur fracture.

Introduction

Fractures of femur whether supracondylar or intercondylar in a T or Y shaped configuration have a huge surgical challenge. These fractures are difficult to treat and operative treatment is usually recommended for favorable outcome[1–4]. These are associated with high energy trauma (in the youngsters) and osteoporotic bones (in the elderly)[5] and are frequently comminuted and intra-articular. Current generation of distal femoral locking compression plates is pre contoured based on the average bony anatomy of the adult population and they form a fixed angled construct. The pull-out strength of locking screws is higher than the conventional screws and is particularly useful in osteoporotic bones. These plates are designed to apply in minimally invasive fashion to preserve local biology and avoid problems with fracture healing and infection[6,7]. The purpose of this study was to evaluate functional outcome, fracture healing, and the complications of distal femoral fractures using locking compression plates.

Materials & Methods

We reviewed 30 consecutive distal femoral fractures treated with distal femoral locking compression plates between 2013 to 2015. INOR and GSPL distal femoral locking compression plate were used in 18 and 12 patients respectively. There were 18 men and 12 women with mean age of 28 years (range18–62). Preoperative AP and lateral radiographs of affected knee with femur were obtained. All surgeries were carried out at TMSS Medical College Hospital with one hour Before spinal anesthesia broad spectrum antibiotic was given, placing patient on traction table fracture site was exposed via lateral approach both distal & proximal fracture end was clear by currate and fixation with Distal femoral locking compression plate and distally 6.5 mm 4 locking cancellous screw and proximally 4.5 mm 2 locking cortical & 2 cortical screws. In intercondylar frature anatomical reduction internal fixation by 6.5 mm distal thraded lag screw. After operation limb was

immobilized by long leg back slab. Postoperatively limb was maintained in elevated position while patient was in bed analgesia was given as per need. Patients were discharged with non weight bearing for three weeks than removal of slab and quadriceps exercise and flexion upto 90° and radiographic examination showed callus formation allowed walking with pair of crutches. Patients were followed monthly and physiotherapy advised. AP and lateral X-rays of lower femur including knee were taken at monthly intervals and once fracture showed union patient were allowed partial and subsequently full weight bearing. Assessment of results was compared with the criteria laid down by Schatzker and Lambert[4] for supracondylar femoral fractures, as given below.

Criteria of Assessment of Results

Excellent
1.Full extention
2.No varus, valgus or rotatory deformity
3.No pain
4.Perfect joint congruency

Good
1.Loss of length not more than 2 cm
2.Flexion loss more than 20^0
3.Minimal pain
4.Less than 10^0 varus or valgus deformity

Fair
Any two of the criteria in good category

Results

The present study is based on 30 cases of supracondylar and intercondylar fractures of femur admitted to the department of orthopaedics, TMSS Medical College & RCH, Bogra, Bangladesh. All these cases were treated by open reduction and internal fixation using distal femoral locking compression plate at the earliest possible. These fractures are more common in third and fourth decades of life (Table 1).Males (60%) outnumbered females (40%) in such fractures (Table 2). Injury was more common on right limb (53%) (Table 3). In most of cases, the mode of injury was road traffic accidents (83%), rest of the cases occurred because of fall from height & slipping (Table 4).8 cases (26.66%) were with associated injuries (Table 5).The average time taken for union in all cases was 11.6 weeks (Table 7). The range of motion was more than 110° in more than 80% of cases (Table 6). It was seen that the most common complications were knee stiffness (10%) and loss of length (<1.2cm) (6.66%) (Table 8).

Table 1: Showing age incidence.

Age in years	No of cases	Percentage
15-30	16	53.33%
31-40	10	33.33%
41-50	3	10%
Above 50	1	3.33%
Total	30	100%

Table 2: Showing sex incidence

Sex	No of cases	percentage
Male	18	60%
female	12	40%
Total	30	100%

Table 3: Showing limb involved

Limb involved	No of cases	Percentage
Right	16	53.33%
Left	14	46.66%
Total	30	100%

Table 4: Showing mode of injury

Mode of injury	No of cases	Percentage
Road traffic accident	25	83.33%
Fall from height	4	13.33%
Injury due to slip	1	3.33%
Total	30	100%

Table 5: Showing nature of associated injuries

Nature of associated injuries	No of cases
Fracture of of opposite femur	1
Shaft of the humerus (same side)	2
Fracture both bones forearm same side	1æ
Colle,s fracture	2
Fracture both bones leg	2
Total	8

Table 6: Showing range of movement

Range of movements	No of cases	percentage
130æ or above	15	50%
110æ or above	10	33.33%
90æ-110æ	3	10%
Less than 90æ	2	6.66%
Total	30	100%

Table 7: Showing time take for union

Time taken	No of cases	percentage
10 weeks or less	12	40%
11weeks to14weeks	10	33.33%
15weeks to18weeks	6	20%
More than 18weeks	2	6.66%
Total	30	100%

Table 8: Showing complications

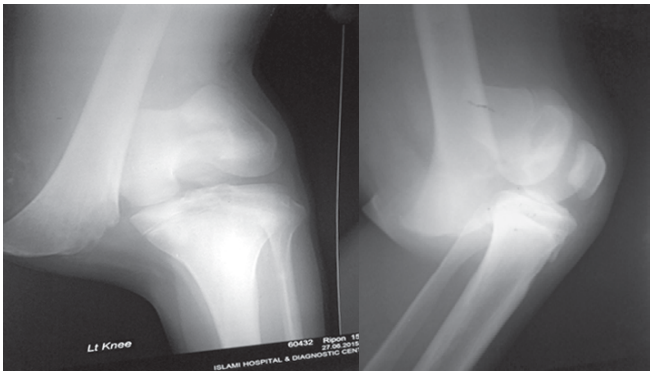
Complications	No of cases	percentage
Vascular compromise	0	0%
Infections Superficial Deep	2 1	6.66% 3.33%
Failure of Fixation	o	0%
Non union	0	0%
Malunion	0	0%
Loss of length (<1.2-2cm0	2	6.66%
Knee stiffness	3	10%

Table 9: Showing results of supracondylar/ intercondylar fractures of femur.

Result	No of cases	percentage
Excellent	20	66.66%
Good	6	20%
Fair	2	6.66%
Poor	2	6.66%
Total	30	100%

To assess the results of treatment of supracondylar / intercondylar fracture of femur criteria laid down by Schatzkeret were used. Excellent to good results were obtained in 86% of cases (Table 9)

Fig 1: Preoperative x-ray showing fracture distal femur.



Anterior/posterior view Lateral view

Fig 2: Per operative Images of Fixation of DFLCP

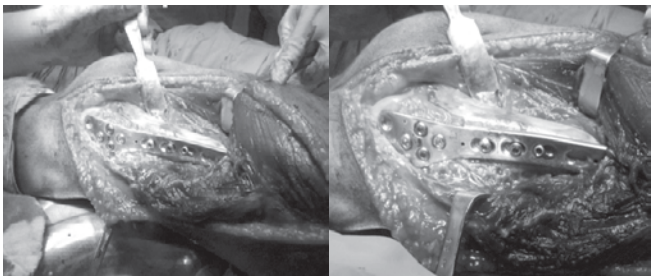
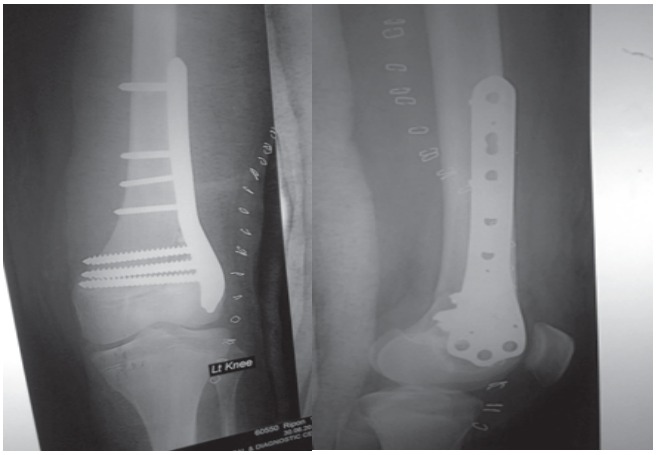


Fig 3: Immediate post operative radiograph of same fracture fixed with



DFLCP

Discussion

To maintain the fracture biology and to minimize the soft tissue trauma, minimally invasive plating techniques have been developed for the fixation of distal femoral fractures. The main goals of the above-mentioned techniques are to maintain the important anatomy and to promote early fracture healing. Locking compression plate systems such as the LISS[9] have been extensively used for distal femoral fractures[10–13]. LISS has a lower risk of early implant loosening than the dynamic condylar screw[14] and promote serially mobilization[15,16] and rapid healing without bone grafting[15] with low risk of infection[15,16] and less blood loss[16].The DFLCP differs from the LISS in that the DFLCP has combination holes and does not have a jig (9). Pain over lateral aspect of the distal femur following fixation with LISS has been attributed to the jig[13]. Previous studies have demonstrated successful early results and relatively low complication rates using minimally invasive plating techniques for the fractures of distal femur[12,17,18].

We have used minimally invasive plate fixation technique using standard lateral approach for the fixation of distal femoral fracture. However, more extensive approaches are needed for fixation of complex intra-articular fractures. In our series of 30 patients, there were 3 cases of infection and no cases of nonunion. As reviewed by Miclau et al.[19] bone graft rates of supracondylar femur fractures ranged between 0% and 87%. Relatively low rate of bone grafting in our series is probably due to improved surgical technique with better soft tissue handling. The results of our study suggest that use of standard lateral approach distal femoral fractures and results in improved exposure of the knee joint and better union rates with low incidence of bone grafting. However randomized trials are needed to assess this technique.

Conclusion

It was concluded that distal femoral locking compression plate is an effective and technically undemanding method for treatment of supracondylar and intercondylar fractures of femur.

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