



Orthopaedic

ROLE OF LOCKING COMPRESSION PLATE IN THE TREATMENT OF LONG BONE FRACTURES IN ADULTS- A STUDY OF 30 CASES

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ABSTRACT

With the increase in number of fast moving vehicles in today's world, there is rise in the number and severity of accidents. Accident may be associated with multi-system organ injuries. When a bone is fractured, it loses its structural continuity. The LCP (Locking Compression Plate), the product of combination of dynamic compression plate and point contact fixator, is in line with the latest plating techniques, the aim of which is to achieve the smallest possible surgical incisions and to preserve the blood supply helps to achieve satisfactory results in these cases. The present study was concluded on 30 patients (20 tibia, 30 femur) admitted MMIMSR, Ambala. The age group of patients in the study varied between 18 - 75 years. Patients were evaluated for locking compression plate in the treatment of long bone fracture. The patients were followed up for up to minimum period of 3 months. 97% of our cases achieved excellent to good results.

KEYWORDS : LCP: Locking compression plate, MIPPO: minimal invasive percutaneous plate osteosynthesis, ORIF: open reduction internal fixation.

INTRODUCTION

Locking plates potentially provide high stability in to a degree that a second plate is not required. The increased stability is the result of the difference in the mechanics of conventional plate and locking plate fixation. Stability is maintained at the angular stable screw plate interface. Because the screws are locked to the plate, it is difficult for one screw to pull out or fail unless all adjacent screws fail. The increase in stability provided by locking plates is most helpful to surgeons treating a fracture in poor- quality bone, a comminuted bicondylar fracture for which a single plate may not provide adequate stability².

The recent introduction in locking compression system and point contact devices further reduces contact between the plate and the bone and has been found and is bio compatible⁹. The Less Invasive Stabilization System (LISS) is being used to achieve minimum invasive percutaneous osteosynthesis (MIPPO)¹⁰. The LCP (Locking Compression Plate), the product of combination of dynamic compression plate and point contact fixator, is in line with the latest plating techniques, the aim of which is to achieve the smallest possible surgical incisions and to preserve the blood supply to the bone and the adjacent soft tissues³.

Locked plating is one of the most modern plating techniques, the aim of which is to achieve the smallest possible surgical trauma, small incisions, preserve blood supply of the bone and adjacent soft tissues, and to ensure a minimal bone-implant interface⁴.

MATERIAL AND METHODS

A prospective study was conducted in our hospital for fracture of long bones of lower limbs after an informed consent. This study was conducted with due emphasis for clinical observation and analysis of results after surgical management for role of locking compression plating in fracture of long bones. All patients were evaluated clinically and radiographically at the time of admission. Fracture patterns like comminuted fractures, fracture with nonunion, peri-prosthetic fracture, metaphyseal fractures and fractures in osteoporotic bones were chosen for LCP fixation. All the fractures were fixed with LCPs taking care to protect the periosteal blood supply. Under regional or general anesthesia, involved leg was prepared and draped. Tourniquet was routinely applied but inflated only when necessary. Bone grafting was done in old ununited fractures and early range of motion exercises was started in stable fixation. Any associated medical problems were taken care before patient is taken for operation. SEX No. of cases MALE 24(80%) FEMALE 6(20%) TOTAL 30(100%) MODE OF TRAUMA RTA 23(77%) FALL AT HOME 7(23%) TOTAL 30(100%) In fracture of femur a lateral incision was made, in fractures of tibia lateral incision for proximal end and lateral and medial for distal end, fracture site exposed. Fragments were first reduced and hold with K-wires. Reductions were achieved and a LCP plate was applied. Locking screw applied in distal metaphyseal portion & proximal diaphysis. K-wires used for holding the fragments were removed. In cases where LISS technique was also used for supracondylar femur, proximal and distal tibia fractures. Operations were performed directly by a consultant orthopedic trauma surgeon or under their immediate supervision. The LCP was used as a bridging construct across the diaphyseal— metaphyseal fracture. Where appropriate, articular

fragments were anatomically reduced and rigidly fixed via separate small incisions. Splintage and immobilization was applied as per fixation achieved. After discharge from hospital patient was follow up after 2 weeks for suture removal and wound examination. Than after six weeks patient was assessed clinically and radiologically. Thereafter patient was assessed every four weekly. Full weight bearing was permitted to patient based on radiological evidence of callus formation and For assessment of results of distal femur fracture reduction was done according to modified Mehrotra's Grading⁵ and Scoring was taken likewise Grade I = 3 points; Grade II = 2 points; Grade III = 1 point. Excellent = 21-27 points; Fair = 15-20 points; Poor = 9-14 points.

SEX	No. of cases
MALE	24(80%)
FEMALE	6(20%)
TOTAL	30(100%)
MODE OF TRAUMA	
RTA	23(77%)
FALL AT HOME	7(23%)
TOTAL	30(100%)

OBSERVATIONS AND DISCUSSION

TABLE-1

TABLE-2

Various variables	No of cases	Percentage
Operative technique		
MIPPO	12	40
ORIF	18	60
Post-operative complication		
Implant failure	1	3.3
Infections	0	0
range of motion		
90% and more	2	7
0-89%	15	50
Full	13	43
Evaluation of result		
Excellent	23	77
Fair	6	20
Poor	1	3

Table 1: Distribution of All lower limb patients treated by LCP according to their age group and type of fracture

Table 2: Distribution of variable related to distal femur fracture and outcome of LCP implanted operative procedure

Now a days Locking compression plate are highly used in treatment for fracture of long bones. Due to least number of complications and high number of union and fixation rates these locking compression plates (LCP) are widely accepted for fracture fixation. Principle of locking compression plate is to provide absolute stability by making a interface between screw and plate. Locking compression plate are applied sub periosteally so that blood supply can be preserved and faster rate of union can be achieved. LCP can also be used as conventional plates by applying the principle of dynamic compression as a pure external fixator by using bicortical screw. Combined with minimally invasive implant technology (MIPO), the indication spectrum of plate osteosynthesis can be expanded in a meaningful manner.

Out of 90 cases 80% were male and 20% patients were female. Majority of the cases 23(77%) were injured due to road traffic

accident (RTA) followed by 7 (23%) cases were of fall at home (Table 1).

Majority of the patients (96.7%) started weight bearing within 2-3 months post operatively. In our study 8 cases are of 43-A1, 4 cases of 33-A2, 3 cases each of 33-A1, 41-A2, 43-A2, 2 cases of 32-A2, 1 case each of 33-A3, 41-A1, 41-A3, 41-C1, 43-B1, 43-C3, 44-A2. In 60 % of cases direct reduction was done and in 40% cases MIPPO was done. Almost 95% of pateints allowed weight bearing after 10-12weeks.

Table 3: Comparision of final results.

AUTHOR	RESULTS	
	EXCELLENT/FAIR	POOR
Schtazker & Lambert et al ⁶	71%(with AO techniques) 21%(without AO techniques)	29% 79%
Gupta RK et al ⁷	96%	4%
Gajendra R et al ⁵	80%	20%
Shrestha D et al ⁸	95%	5%
Our Study	97%	3%

RESULT: In our study satisfactory results i.e. excellent and fair results were 97% which were comparable with other studies of schtazker & lambert et al⁵⁹:92%, Gupta RK et al⁴³:96%, Gajendra R et al⁵⁸: 80% , Shrestha D et al⁶⁰: 95%. In our study the poor result was 3% which was non-union due to implant failiure. Which was comparable to other studies of Gupta RK(C) et al which was 4%, Gajendra R et al which was 20%, Shrestha D et al which was 5%.

Favourable results of LOCKING COMPRESSION PLATE might be contributed to the fact that Locking compression system provides early weight bearing and good functional status in majority of patients with minimal complication with sutailable techniques.

CONCLUSION

We concluded that LCP is the most common and widely used orthopaedics implant for fixation of fracture in long bones, LCP are used by both MIPO and ORIF techniques. The various principles like Briging, neutralizing, mechanical, Point fixation and dynamic compression principle are available in LCP and can be used as per requirement.

Locking compression provides:-

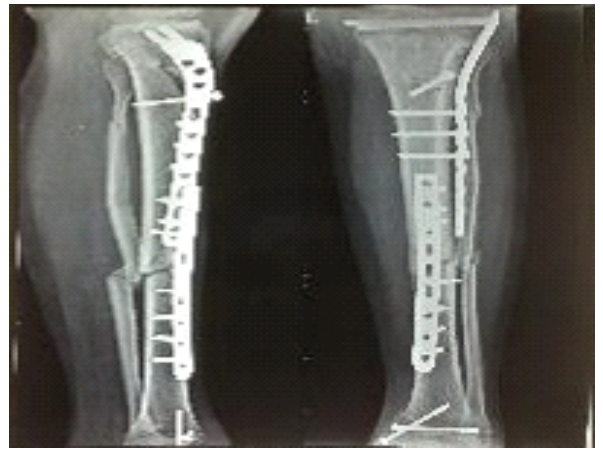
- Absolute stability
- Minimal obliteration to blood supply
- Minimal periosteum stripping
- Increased rate of union
- Early range of motion
- Act as internal fixator
- Decrease chances of infections and non-union
- Minimal surgical exposure if done by MIPO

Using MIPO is technically feasible and advantageous, that it minimises soft tissue compromise and devascularisation of the fracture fragments⁶¹. The procedure includes three important components: bone reduction (indirect reduction in MIPPO), minimal soft tissue dissection and stabilisation with a long percutaneously inserted plate fixed with a limited number of widespread.

CASE I



Pre-operative X-ray of patient



Post-operative X-ray of patient



Intra-operative picture of case



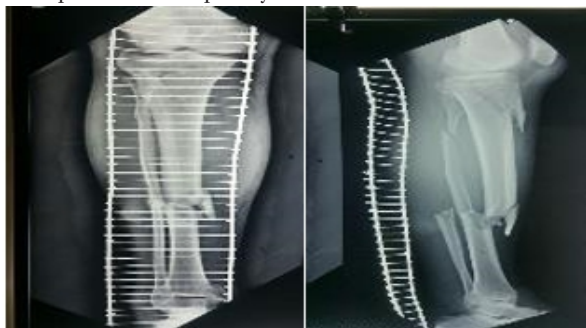
Patient sitting cross-legged at 3 months of follow-up



Post-operative follow-up X-Ray CASE II



Patient knee flexion at 3 months follow up



Pre-operative X-ray of patient



Patient doing SLR at 3 months of follow-up

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