# GREENS SURGICALS

**( ISO 9001:2000 & Certified Company)**

## L C-L CP

## L imited Contact

## L ocking Compres s ion P late

LCP T-Plate 3.5mm
Oblique Angled / Left

LC LCP 4.5/5.0mm Broad

Locking Proximal
Humerus Plate (LPHP)

LCP Cloverleaf Plate
3.5mm


The venture GREENS SURGICALS has been necessitated by the hitherto prevailing communi-cation gap between the practitioners and the manufacturers of the equipments and implants. Therefore, I have taken a humble step to bridge this perceptual gap, with the hope that there will be a better synergy between the two.

As a practitioner myself, I can well imagine the challenges of the operation theater. There are occasions when the situation demand innovations for better results. And this is exactly where a practitioner-manufacturer has inherent advantages. He can better grasp and respond to the specific requirements, if so requested. True to this spirit, we are trying our best to come to your expectations and fulfilling your ever-expanding requirements. We are persistently involved in design development and manufacture of various Implants and Instruments according to the needs of orthopaedic surgeons. In recognition of our honest efforts, we have also been awarded with ISO 9001:2000 and CE rtification which is Internationally recognized.

While undertaking this challenging venture, every care has been taken to ensure the quality of the products of highest standards. The implants have been made up according to International standards. My motto has been essentially driven by the concerns towards facilitating the needs of the practicing orthopaedic surgeons, the needs that are met easily, and what is more important, reliably.

**Dr. Vinay Kumar**
M.B.B.S (Hons) Gold Medalist,
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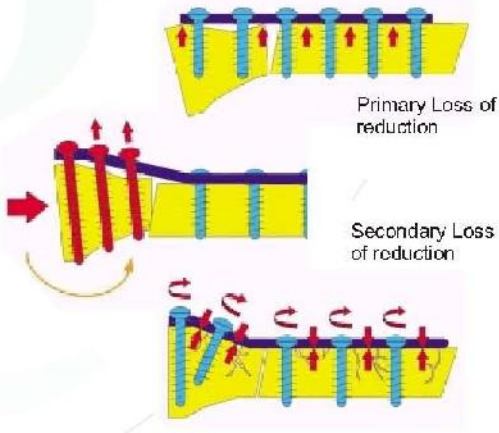
# INTRODUCTION

Bone fractures lead to a complex tissue injury involving both the bone and the surrounding soft tissues. Treated in a conservative way, fractures often result in malalignment or non-unions as well as lead to stiffness of adjacent joints. To reduce the occurrence of these problems, open reduction and internal fixation of the bone can be carried out.

The clinical outcome is dependent on obtaining correct length, axis and rotation of the fractured bone rather than on precise anatomical reduction and absolute stability.

Plate and screws systems where the screw can be locked in the plate, so-called Locked Internal Fixators,were seen as a solution to these problems, Fig. 2. The plate and screws form one stable system and the stability of the fracture is dependant on the stiffness of the construct. No compression of the plate onto the bone is required, which reduces the risk of primary Loss of reduction and preserves the bone blood supply. Locking the screw into The plate to ensure angularas well as axial stability eliminates the possibility for the screw to toggle, slide, or be dislodged and thereby strongly reduces the risk of postoperative loss of reduction.




The first half of the hole comprises a Dynamic Compression Unit and is intended for a standard cortex or cancellous bone screw. As in a Standard Dynamic Compression Plate, eccentric pre-drilling allows axial compression of the fracture to be achieved. Furthermore, the screw can be angulated, both laterally and longitudinally, respective to the plate axis. The threaded half of the hole is conical and permits the locking Of the special Locking Head Screws (3.5 mm in diameter for the LCP small fragment plate and 5.0 mm in diameter for the LCP large fragment Plate).

# COMPARISON OF LCP & DCPs

| LC-LCP | LC-DCP | DCP |
|---|---|---|
| Respecting the local soft tissues and damaging them as less as possible. | Local soft tissue like blood vessels are less damaged compared to DCP. | Vascularity is disrupted beneath the plate. |
| LCP allows screws to lock onto slots on the plates themselves. So Plates can be positioned away from the bone. | Stability by rigid friction between plate and bone. | Stability by rigid friction between bone. |
| Acts like internal / external Fixator. | Acts like internal fixator. | Acts like internal fixator. |
| Unicortical purchase is Sufficient. | Bi-cortical screw purchase. | Bi-cortical screw purchase. |
| Acts like Compression and angular plate. | Acts like compression plate only. | Acts like compression plate only. |
| Very useful in periarticular, metaphyseal, diaphyseal, osteoporotic and periprosthetic fractures. | Useful in diaphyseal fractures. | Useful in diaphyseal fractures. |
| Primary loss of reduction Does not occur. | Primary loss of reduction may occur. | Primary loss of reduction may occur. |

## ADVANTAGES OF LCP

1. With reference to the mechanical, biomechanical and clinical results, the new LCP with combination holes can be used, depending on the fracture situation: -

   ( i ) as a compression plate - fixation with standard bone screws

   ( ii ) as a locked internal fixator- fixation with locking head screws

   ( iii ) as an internal fixation system combining both techniques- fixation with a combination of standard screws and locking head screws.


**Combi-hole** | **Combi hole with locking head screw** | **Combi hole with stand screw**

2. Locking screw do not rely on plate bone compression to maintain stability but Functional similarity to multiple small angled blade plates.

3. Angular stable fixation of fragments regardless of bone quality. Good purchase also in osteoporotic bone and in multifragment fractures, where traditional screw purchase is compromised.

4. LCP's are very useful in periarticular, metaphyseal, diaphyseal and periprosthetic fractures.

5. Minimised risk of primary and secondary loss of reduction, even under high dynamic loading.

6. Reduced impairment of periosteal blood supply: -

   ( i ) Due to the limited plate contact.

   ( ii ) Locking minimizes the compressive forces exerted by the plate on the bone.

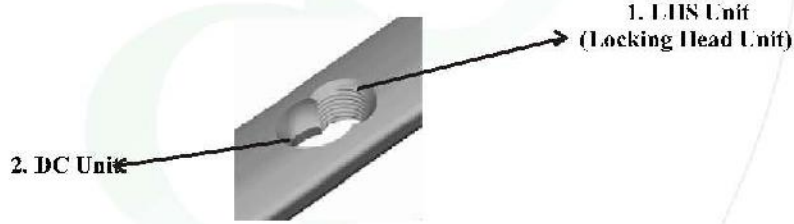
   ( iii ) Precise anatomical contouring of a plate is no longer necessary. Plate does not need to touch the bone at all.

## DISADVANTAGE OF LCP

Hardware failure (plate failure, or screw breakage) is a complication that has been reported to occur in as many as 7% of plate fixations.

| Operative Technique | Drill Bit Used | Drill Tap |
|---|---|---|
| Small Fragment or 3.5/4.0MM LCS Screw System | 2.5MM | Not Required |
| Large Fragment 5.0MM LCS Screw System | 4.3MM | Not Required |

## LCP Hole




## Which Screw is to be used first?

## LHS / Standard Screw

If axial compression is desired, standard screw to be used first.

In the same fragment LHS screw should not be followed by standard screw but vice versa may be, Means first standard screws is to be fixed followed by LHS. Standard screw produces inter fragmentary (axial) compression as well as pulls the bone to the plate.

If already locked with LHS and we plan to put standard screw, first we should dislodge the screw head from plate & then with the help of neutral drill guide standard screws should be fixed. Using the eccentric drill guide shifts the fragment to fracture site thus shaft of LHS screw also shifts and then locking may not be possible.

If one fragment is fixed with locking head screws other fragment subsequently may be fixed with standard screw by using either neutral or eccentric drill guide and one mm of dynamic compression may also be produced. But if want to achieve 2mm of dynamic compression, both sides standard screw to be used first followed by LHS screw.

# SURGICAL TECHNIQUE

## STEPS OF OPERATION

1. Plate placed over bone either by exposure of bone or minimally invasive Technique.
2. Reduction may or may not be done depending or fracture types.
3. Plate stabilized using 1.5mm uni-cortical K-wire at both ends.
4. If dynamic compression is required standard screw should be used first at least one screw proximal & one distal to fracture for achieving maximum compression (2mm).
5. But K-wire should be removed before head of screw engages into the plate.
6. Followed by LHS screw to be fixed.

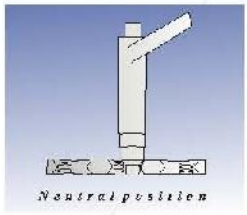
## CONTOURING OF THE LCP

1. LCP'S are pre-contoured plate. But may be contoured to adapt the anatomy of bone. Contouring of plate to fix epi and metaphysical region should be taken precaution to prevent screws going into joints.
2. Mild degree of centering is possible but to a greater degree may distort the hole and locking of screw may not be possible.
3. Internal fixation using LCP without Locking Head Screw LCP may be used as a DC plate by using conventional cortex and cancellous screws.
4. Since the direction of the locking screw is determined by plate designs, final screw position may be verified with K-wire prior to insertion. This becomes especially important when the plate has been contoured or applied in metaphyseal regions around joint surfaces.
5. Insertion of cortex or cortical bone screws.

## USE OF DRILL BITS

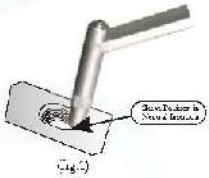
| ***Screw Type Dia*** | ***Drill Bit for LHS Unit*** | ***Drill Bit for DC Unit*** |
|---|---|---|
| 1). 3.5mm Locking Head Screw | 2.8MM | - |
| 2). 3.5mm Cortex Screw | - | 2.5MM |
| 3). 4.0mm Cancellous Bone Screw | - | 2.5MM |
| 4). 4.5mm Cortex Screw | - | 3.2MM |
| 5). 5.0mm Locking Head Screw | 4.3MM | - |
| 6). 6.5mm Locking Head Screw | - | 3.2MM |

Neutral or Eccentric insertions of standard screw DCP or LC-DCP drill sleeves are not suitable for LCP combination hole. A special universal drill sleeve is used to make neutral or eccentric hole in DC portion of combined combination hole.

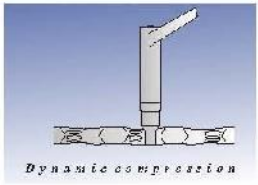



### Neutral Insertion

If spring loaded guided is pressed against the bone into the DC portion of LCP hole the inner tube retracts and the rounded end of the outer tube glides down the slope of the hole to the neutral position. This allows the neutral pre-drilling.

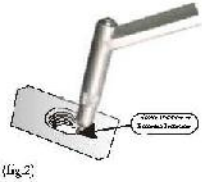


(fig.1)




### Dynamic compression, Eccentric insertion

The extended portion of universal drill sleeve is placed at the end of DC portion (eccentric poison) of combination hole. Drill hole with 2.5mm for small fragment and 3.2mm for large fragment plates. Insertion and tightening of the cortex screws will produce dynamic compression. The generated Compression corresponds to that obtained with DCP or LC-DCP plates.



(fig.2)

## Fixation with Locking Head Screws

1. Screw the threaded LCP Drill guide into the desired LCP hole. Holding the plate in the last hole may help slipping the plate over bone for Liss operations.

(Fig.3)

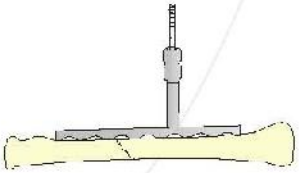
2. Secure the temporary fixation of LCP to the bone with the help of 1.5mm K-wire near the end holes. K-wire may be placed uni-cortical.

(fig 4)

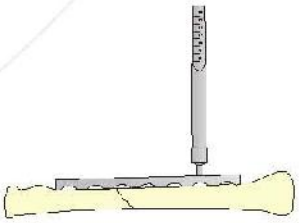
**Note: -**

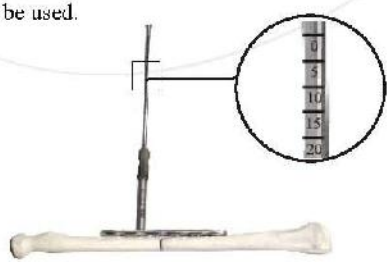
K-wire should be pulled out before the onset of dynamic compression.

3. For small fragment plate 2.8mm drill bit & for large fragment 4.3mm drill bit used thorough LCP drill guide down to desired depth.

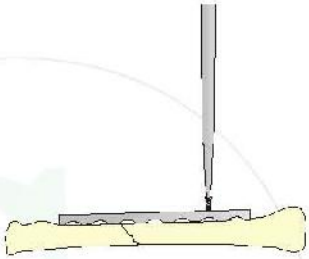


4. The laser marks on the drill bit allow direct measurement of the drill depth. Alternatively depth gauge may be used.



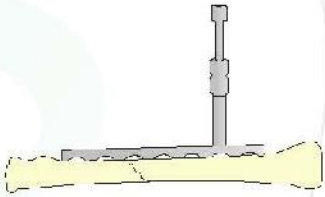


5. Hexagonal screw driver used 3.5mm screw driver for small fragment or 4.5mm screw driver for large fragment. Alternatively torque limiting screw driver may also be used.

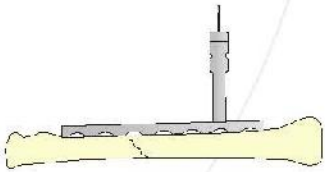


## Screw placement verification

1. With the 2.8 mm Threaded Drill Guide in place, insert the1.6 mm Wire Sleeve into the threaded drill guide.



2. Insert a threaded 1.6 mm Kirschner Wire through the wire sleeve and drill to the desired depth.



## Postoperative Treatment

Postoperative treatment with Locking Compression Plates does not differ from conventional internal fixation procedures.

## Implant Removal

To remove locking screws, unlock all screws from the plate; then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when removing the last locking screw.

# SELECTION OF PLATES SIZES

## 1. Femoral and Tibia fractures

Mainly loaded in compression. The position of first screw near the fracture and additional screw depends on fracture gap size.

(A) In simple fracture :

If gap is < 2mm : 1 or 2 plate holes near the fracture gap should be omitted to allow fracture motion and bone contact to occur.

If gap is > 2mm : Plate holes near the fracture gaps should be fixed.

(B) For communted fracture:-

3 screws on either side of the fragment with 2 screws as close as practicable to the fracture site.

## 2. Humerus and forearm

Mainly torsional load predominates. Torsional rigidity depends more on the number of screws than axial stiffness. 3-4 screws in each main fragment are recommended.

**NOTE:** -

If plate is placed at a distance from the bone for anatomical reasons, the screw should bepositioned closer to the fracture site to improve construct stability.

# LC-LCP'S RANGE OF IMPLANTS

## Small Fragment LC-LCP'S Plate & Screws

1.LC LCP - 3.5mm

2.LCP T Plate - 3.5mm
Right Angled

3.LCP T-Plate 3.5mm
Oblique Angled / Right

4.LCP T-Plate 3.5mm
Oblique Angled / Left

5.Locking round hole
Reconstruction Plate 3.5mm

6.LCP Cloverleaf Plate
3.5mm

7.LCP - Reconstruction
Plate 3.5mm

8.Spacer 3.5mm Dia
Length 2.0mm

9.Self tapping 3.5mm
locking head screws

10.Locking Proximal
Humerus Plate (LPHP)

## Large Fragment LC-LCP'S Plate & Screw

1.LC LCP 4.5/5.0mm Narrow

2.LC LCP 4.5/5.0mm Broad

3.LCP T - Plate 4.5/5.0mm

4.LCP T-Buttress Plate
4.5/5.0mm

5.LCP L-Buttress Plate
4.5/5.0mm, Left Leg

6.LCP L-Buttress Plate
4.5/5.0mm, Right Leg

7.LCP Reconstruction Plate
4.5/5.0mm

8.LCP Spacer for LCP 4.5/5.0
Length 2.0mm

9. Self Tapping 5.0mm
Locking Head Screw

# LC-LCP INSTRUMENTS

## Small Fragment

1. LCP Drill Guide - 2.8mm

2. LCP Drill Sleeve Combined - 2.8mm

3. Drill Bit Calibrated - 2.8mm

4. Screw Driver - 3.5mm

## Large Fragment

5. LCP Drill Guide - 4.3mm

6. LCP Drill Sleeve Combined - 4.3mm

7. Drill Bit Calibrated - 4.3mm

8. Screw Driver - 4.5mm

# *Manufacturer & Exporter of Orthopaedic Implants & Instruments*

## GREENS SURGICALS

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