LCP™ Proximal Femoral Hook Plate 4.5/5.0

Part of the LCP Periarticular Plating System

Surgical Technique

AO approved by AO Technical Commission

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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Overview

The DePuy Synthes LCP™ Proximal Femoral Hook Plate 4.5/5.0 is part of the LCP Periarticular Plating System, which merges locking screw technology with conventional plating techniques.

The LCP Periarticular Plating System is capable of addressing

- fractures of the proximal femur with the LCP Proximal Femoral Plate 4.5/5.0 or the LCP Proximal Femoral Hook Plate 4.5/5.0.

The LCP Periarticular Plating System also contain the following systems:

- LCP Condylar Plate 4.5/5.0
- LCP Proximal Tibia Plate 4.5/5.0
- LCP Medial Proximal Tibia Plate 4.5/5.0

Locking Compression Plate

The Locking Compression Plate (LCP) has combi-holes in the plate shaft that combine a dynamic compression unit (DCU) hole with a locking screw hole.

■ Note:

More detailed information on conventional and locked plating principles can be found in the DePuy Synthes Locking Compression Plate (LCP) Technique Guide.

LCP Proximal Femoral Hook Plate System

The locking screws create a fixed-angle construct while using familiar AO plating techniques. Locking capability is important where screw purchase is compromised. These screws do not rely on plate-to-bone compression to resist patient load.

- Anatomically contoured to approximate the lateral aspect of the proximal femur.
- Two proximal hooks engage the superior tip of the greater trochanter.
- Use of locking screws may provide an angular stable construct.
- The most proximal screw hole accepts a 7.3 mm cannulated locking or cannulated conical screw, oriented at 95° to the plate shaft.
- The second proximal screw hole accepts a 5.0 mm cannulated locking screw oriented at 110° to the plate shaft.
- The combi-holes in the plate shaft accept 5.0 mm locking screws in the threaded portion or 4.5 mm cortex screws in the DCU portion.
- Accepts the articulated tension device to tension the plate and create a load-sharing construct.
- Limited-contact stainless steel plate.
- Available in 316L stainless steel.

Intended Use, Indications and Contraindications can be found in the corresponding system Instructions For Use.

The AO Principles of Fracture Management

Mission

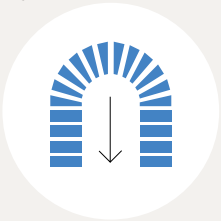
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

1.

Fracture reduction and fixation to restore anatomical relationships.

2.



Fracture fixation providing absolute or relative stability, as required by the "personality" of the fracture, the patient, and the injury.

3.

Preservation of the blood supply to soft-tissues and bone by gentle reduction techniques and careful handling.

4.

Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg New York: Springer 1991.
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

1. Preparation

Required sets
LCP Proximal Femoral Hook Plate Set 4.5/5.0 (stainless steel)
Periarticular LCP Plating System Instrument Set
Cannulated Locking and Cannulated Conical Screw ∅ 5.0 and 7.3 mm Set
LCP Large Fragment Instrument Set
LCP Large Fragment Screw Set

Complete the preoperative radiographic assessment and prepare the preoperative plan. AP and lateral radiographs of the entire femur are necessary for complete evaluation. Traction radiographs and views of the contralateral femur are useful adjuncts in the planning process.

When considering use of the LCP Proximal Femoral Hook Plate 4.5/5.0, identify proper placement of the two proximal screws.

Determine plate length, and approximate screw lengths and instruments to be used.

Position the patient supine on a radiolucent operating table or a fracture extension table for lower energy fractures. Fluoroscopic visualization of the femur in both AP and lateral views must be verified prior to patient draping.

2. Reduce fracture

Reduce the fracture using a fracture table, clamps, Schanz screws, or other conventional reduction techniques. Alternatively, provisional indirect fracture reduction may be facilitated by attaching the LCP Proximal Femoral Hook Plate 4.5/5.0 to the proximal segment with appropriately oriented screws, and then to the diaphysis with plate holding forceps or 4.5 mm cortex screws.

▲ Precaution:

The fracture has to be meticulously reduced in order to avoid implant failure.

3. Insert guide wires

Instruments	
310.243	Guide Wire ∅ 2.5 mm, with drill tip, length 200 mm, Stainless Steel
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm
324.175	Wire Guide 7.3, for Guide Wire ∅ 2.5 mm
Alternative	
332.210	Impactor

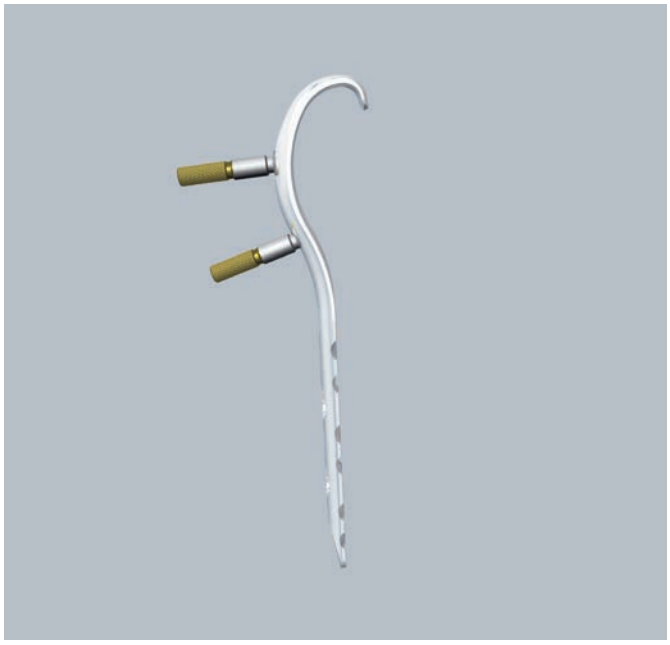
Before placing the plate on the bone, thread the wire guides into the plate holes for each of the proximal locking screws. Use the wire guide 7.3 in the proximal screw hole, and a wire guide 5.0 in the second locking screw hole. The wire guides can also be used as a manipulation aid for positioning the plate on the proximal femur.

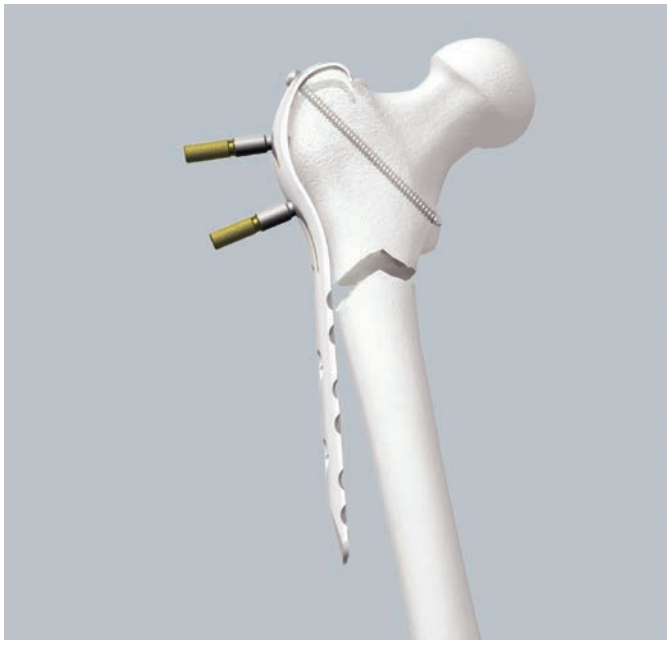
Seat hooks using a 4.5 mm cortex screw aimed toward the lesser trochanter. Screw may be removed following insertion of 7.3 mm screw in the proximal fragment.

Alternative: The impactor may be used to seat the hooks in the proximal fragment.

▲ Precaution:

Avoid a collision between the 4.5 mm cortex screw and the 7.3 mm screw.





Using fluoroscopic image control (AP and lateral), insert a guide wire ∅ 2.5 mm through the wire guide in each of the proximal locking holes. Guide wires should reach, but not penetrate, subchondral bone.

- Placement of the proximal guide wire in the AP view is into the midportion of the inferomedial quadrant of the femoral head along a path subtending a 50° angle relative to the calcar femoralis. Guide wire placement in this manner will facilitate placement of the proximal locking screw at a 95° angle to the femoral shaft.
- The proximal guide wire is ideally placed central in the lateral view. Accurate positioning of the proximal guide wire (and ultimately the locking screw) assures frontal plane alignment.

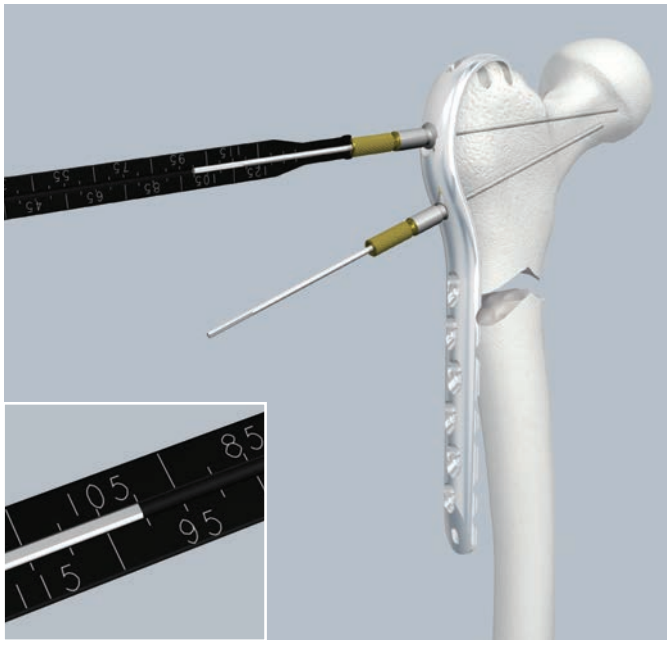
Notes:

- Before a guide wire is inserted into the second wire guide, verify correct sagittal plane alignment of the plate on the proximal femur. This usually requires both visual and fluoroscopic assessment and reduces the risk of an extension (apex anterior) deformity when the plate is attached to the diaphysis. When this alignment is satisfactory, insert the guide wire through the next (distal) wire guide, maintaining biplanar fluoroscopic control.
- It is more important to properly place guide wires in the proximal femur (considering the desired screw positions and trajectories) than it is to precisely match the contour of the plate to the anatomy of the femur. The ability to lock the screws to the plate obviates the need for precise plate contouring and compressing the plate to the bone.

4. Insert proximal 7.3 mm cannulated screw

Instruments	
314.050	Screwdriver, hexagonal, cannulated
319.701	Measuring Device
314.230	Screwdriver Shaft, hexagonal, cannulated
338.490	Quick Coupling for Small Air Drill
511.771	Torque Limiter, 4 Nm, for Compact Air Drive and Power Drive

For predrilling in dense bone	
310.632	Drill Bit ∅ 5.0 mm, cannulated
310.634	Drill Bit ∅ 4.3 mm, cannulated



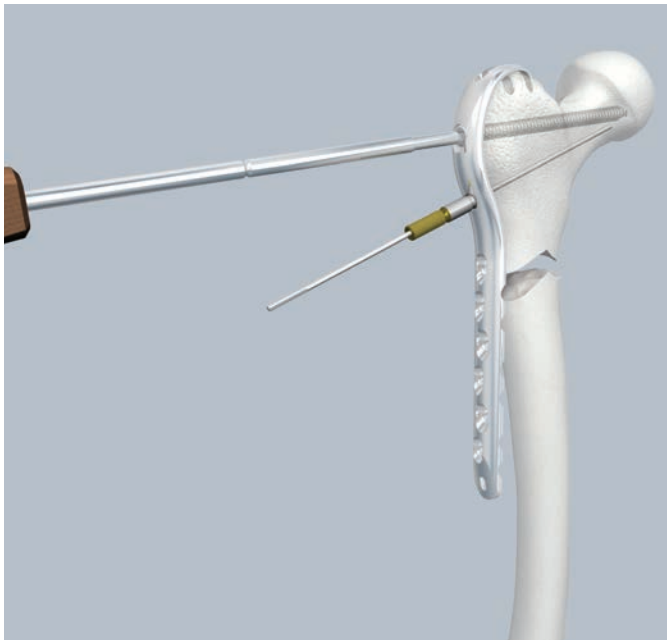
Use the measuring device over the guide wire to measure for screw length. Select the appropriate length 7.3 mm cannulated locking screw. Use the cannulated hexagonal screwdriver to remove the wire guide.

■ Note:

The self-drilling, self-tapping flutes of the 7.3 mm and 5.0 mm screws make predrilling and pretapping unnecessary in most cases. In dense bone, the lateral cortex can be predrilled, if necessary.

- Use the 5.0 mm drill bit for 7.3 mm screws.
- Use the 4.3 mm drill bit for 5.0 mm screws.

Insert the locking screw using fluoroscopy with power equipment and the 4 Nm torque limiting attachment. However, final seating and tightening must be done manually. Once the screw has been locked to the plate, the guide wire may be removed.



▲ Precautions:

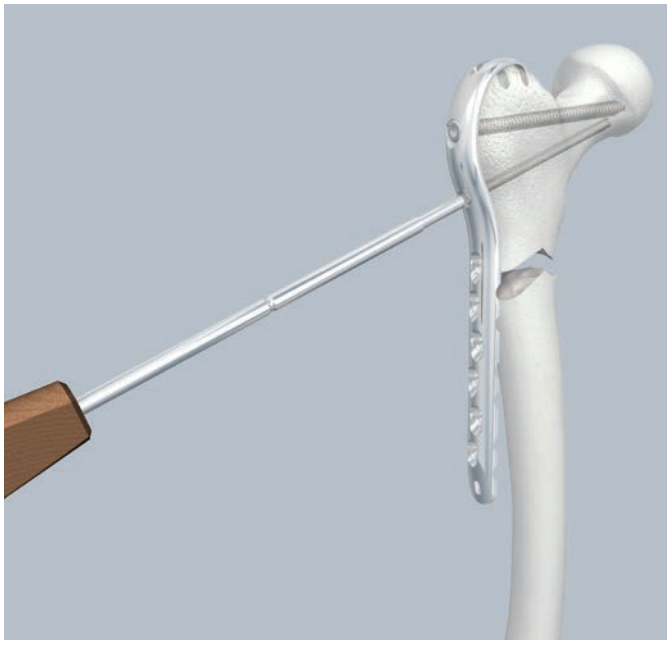
- Do not engage the screw head with the plate hole while inserting under power. Screw engagement and final locking must be done manually with the torque limiter.
- Angular stability cannot be achieved with cannulated conical screws. It is always recommended to replace conical screws with locking screws to ensure angular stability.
- Recheck each locking screw prior to closing to verify that the screws are securely locked to the plate. Screw heads must be flush with the plate in the locked position before they can be considered fully seated.

■ Note:

In cases where it is necessary to pull the plate to the bone, use a fully threaded 7.3 mm cannulated conical screw in the proximal screw hole. However, use caution to avoid changing the alignment of the guide wire with the conical screw. If misalignment occurs, it may preclude final exchange of the conical screw for a locking screw, and thereby weaken the overall strength of the plate construct.

5. Insert 5.0 mm cannulated screw

Instruments	
314.050	Screwdriver, hexagonal, cannulated
319.701	Measuring Device
314.230	Screwdriver Shaft, hexagonal, cannulated
338.490	Quick Coupling for Small Air Drill
511.771	Torque Limiter, 4 Nm, for Compact Air Drive and Power Drive
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771



Use the measuring device over the guide wire to measure for screw length. Select the appropriate length 5.0 mm cannulated locking screw. Use the cannulated hexagonal screwdriver to remove the wire guide.

Insert the screw, using fluoroscopy, with power equipment and the 4 Nm torque limiting attachment. However, final seating and tightening must be done manually, using the torque limiter. After one click, the recommended torque is reached. Once the screw has been locked to the plate, remove the guide wire.

▲ Precaution:

Do not engage the screw head with the plate hole while inserting under power. Screw engagement and final locking must be done manually with the torque limiter.

Screw length considerations: The angled 5.0 mm cannulated locking screw is intended to converge with the 7.3 mm screw to create a buttress. This convergence should occur when using a 5.0 mm cannulated locking screw that is 85 mm in length.

■ Note:

Always use a torque limiting attachment when using power to insert locking screws.

▲ Precaution:

Recheck each locking screw prior to closing to verify that the screws are securely locked to the plate. Screw heads must be flush with the plate in the locked position before they can be considered fully seated.

6. Approximate plate to femoral diaphysis

Instrument	
321.120	Tension Device, articulated

Secure the plate to the lateral femoral shaft with bone holding forceps, adjusting horizontal plane alignment (rotation) as appropriate. Length restoration and fracture reduction can be facilitated by a number of indirect means, including a fracture table, the articulated tension device, the large distractor, the large distractor/compressor, or a large external fixator. Judicious, soft tissue preserving, direct reduction techniques with clamps may also be appropriate in some cases.

A tensioning device should be applied to the end of the plate to tension the plate and compress the fracture.

■ Note:

Using the tension device, tension the plate, and compress the fracture to create a load-sharing construct. Creating a loadsharing construct is required with the LCP Proximal Femoral Hook Plate 4.5/5.0.

Alternative: fracture compression cannot be accomplished

Set
LCP Proximal Femoral Plate 4.5/5.0 Set (Stainless steel)

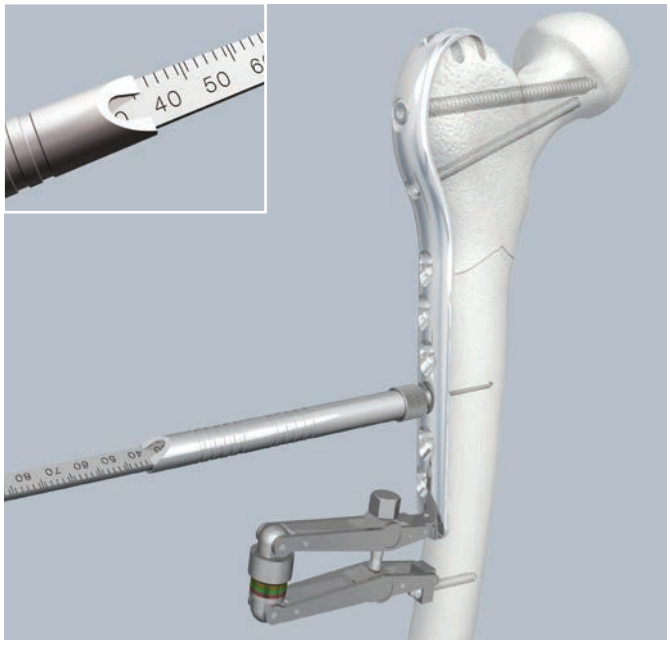
If the fracture pattern includes segmental comminution where fracture compression cannot be accomplished and a bridging construct is necessary, use of the LCP Proximal Femoral Plate 4.5/5.0 (without hooks) may be preferable.

7. Insert 4.5 mm cortex screws

Instruments	
310.310	Drill Bit ∅ 3.2 mm
314.270	Screwdriver, hexagonal, large
319.100	Depth Gauge for Screws ∅ 4.5 to 6.5 mm
323.460	Universal Drill Guide 4.5/3.2, for neutral and load position

Use the drill bit through the universal drill guide to predrill the bone. For the neutral position, press the drill guide down in the non-threaded hole. To obtain compression, place the drill guide at the end of the non-threaded hole away from the fracture (do not apply downward pressure on the spring-loaded tip).

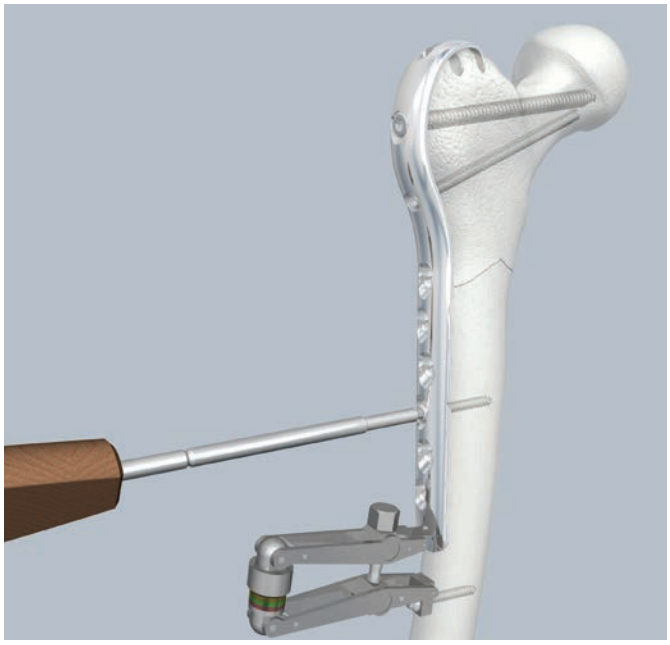
Measure for screw length using the depth gauge.



Select and insert the appropriate length 4.5 mm cortex screw using the hexagonal screwdriver. Insert as many cortex screws as necessary.

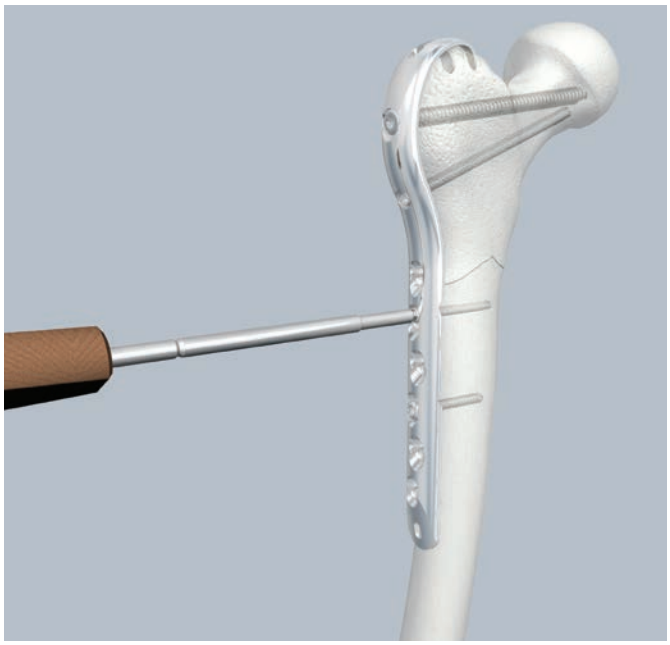
■ Note:

All cortex screws must be inserted into the plate shaft before insertion of any locking screws in the plate shaft.



8. Insert 5.0 mm locking screws

Instruments	
323.042	LCP Drill Sleeve
310.430	LCP Drill Bit ∅ 4.3 mm
319.100	Depth Gauge
511.771	Torque Limiter, 4.0 Nm
314.119	Stardrive Screwdriver Shaft T25, self-holding
314.150 314.152 324.052	Hexagonal Screwdriver Shaft or Screwdriver Shaft, self-holding or Torque-indicating Screwdriver 3.5
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771
311.431	Handle with Quick Coupling for 511.115



Attach the drill sleeve to the threaded portion of the hole in the plate shaft.

■ Note:

Use of the drill sleeve is required. It centers the drill bit in the threaded portion of the combi-hole to create a screw trajectory that ensures that the screw properly engages in the plate.

Carefully drill the screw hole using the drill bit. Read the drilled depth directly from the laser mark on the drill bit or determine the screw length with the depth gauge.

Insert the appropriate length 5.0 mm locking screw with a power tool and the torque limiter or manually with a handle and the torque limiter. The screw has to be tightened manually. After one click, the recommended torque is reached.

▲ Precautions:

- Do not engage the screw head with the plate hole while inserting under power. Screw engagement and final locking must be done manually with the torque limiter.
- Repeat as necessary to insert additional locking screws.
- Recheck each locking screw before closing to verify that the screws are securely locked to the plate. Screw heads must be flush with the plate in the locked position before they can be considered fully seated.

■ Notes:

- For detailed instructions please consult the DePuy Synthes Locking Compression Plate (LCP) Technique Guide.
- Holes for locking screws may be drilled unicortically or bicortically, depending on bone quality.

9. Implant Removal

In case the physician decides to remove the implants, implants can be removed by using general surgical instruments. In case of difficult removal circumstances, a Screw Extraction Set Handling Technique is available with corresponding instructions.

LCP Proximal Femoral Hook Plate 4.5/5.0

Stainless steel	Holes	Length (mm)
242.120	2	133
242.121	4	169
242.122	6	205
242.123	8	241
242.124	10	277
242.125	12	313
242.126	14	349
242.127	16	385

Plates are available non-sterile and sterile packed.
For sterile plates add suffix S to article number.

Additionally available

only sterile packed

Stainless steel	Holes	Length (mm)
242.128S	18	421

Screws

Cannulated Locking Screw ∅ 7.3 mm
(02.207.020–02.207.145)

Creates a locked, screw-plate construct
- Threaded conical head
- Fully threaded shaft
- Self-drilling, self-tapping tip

Cannulated Conical Screw ∅ 7.3 mm
(02.207.250–02.207.295)

Compresses the plate to the bone
- Smooth conical head
- Fully threaded shaft
- Self-drilling, self-tapping tip

Cannulated Conical Screw ∅ 7.3 mm, short thread
(02.207.450–02.207.545)

Compresses the plate to the bone
- Smooth conical head
- Partially threaded shaft
- Self-drilling, self-tapping tip

Cannulated Locking Screw ∅ 5.0 mm
(02.205.025–02.205.145)

Creates a locked, screw-plate construct
- Threaded conical head
- Fully threaded shaft
- Self-drilling, self-tapping tip

Cannulated Conical Screw ∅ 5.0 mm
(02.205.240–02.205.295)

Compresses the plate to the bone
- Smooth conical head
- Partially threaded shaft
- Self-drilling, self-tapping tip

Locking Screw ∅ 5.0 mm
(◉ 213.314–213.390/⬢ 212.201–212.227)

Creates a locked, screw-plate construct
- Threaded conical head
- Fully threaded shaft
- Self-tapping tip

Cortex Screw ∅ 4.5 mm
(214.814–214.940)

- May be used in the DCU portion of the combi-holes in the plate shaft
- Compresses the plate to the bone

Screws are available non-sterile and sterile packed. For sterile screws add suffix S to article number.*

*Not all lengths may be available sterile

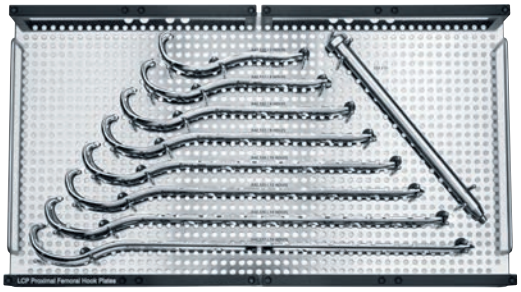
Instruments

Selected instruments of the Periarticular LCP Plating System

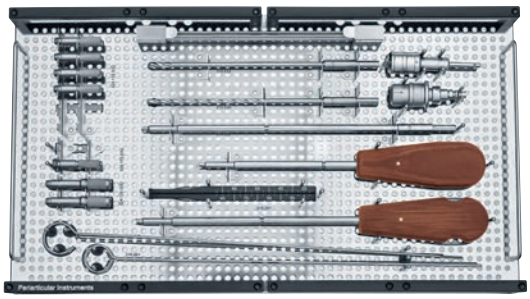
310.243	Guide Wire ∅ 2.5 mm, with drill tip, length 200 mm, Stainless Steel	
310.632	Drill Bit ∅ 5.0 mm, cannulated, Length 200 mm, with Quick Coupling	
310.634	Drill Bit ∅ 4.3 mm, cannulated, Length 200 mm, with Quick Coupling	
314.050	Screwdriver, hexagonal, cannulated, for Cannulated Screws ∅ 6.5 and 7.3 mm	
319.701	Measuring Device for Cannulated Screws ∅ 5.0 and 7.3 mm	
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm	
324.175	Wire Guide 7.3, for Guide Wire ∅ 2.5 mm	

Sets

01.120.327	**LCP Proximal Femoral Hook Plates 4.5/5.0 (stainless steel)**
68.120.333	Insert



01.120.021	**Periarticular Instruments**
68.120.447	Vario Case
68.120.445	Insert



01.120.022	**Cannulated Conical and Cannulated Locking Screws ∅ 5.0 and ∅ 7.3 mm (stainless steel)**
68.122.054	Modular Screw Rack, with Drawer, Measuring Block and Lid, length 200 mm, height 115 mm, size 1/2, without Contents, Vario Case System
68.122.050	Modular Insert, for Modular Screw Rack, for Screws ∅ 5.0 mm, size 1/3, without Contents, Vario Case System
68.122.053	Modular Insert, for Modular Screw Rack, for Screws ∅ 7.3 mm, size 1/3, without Contents, Vario Case System

Additionally required

- LCP Large Fragment Instrument Set
- LCP Large Fragment Screw Set

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213, ASTM F 2052 and ASTM F2119

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils (whole body averaged specific absorption rate [SAR] of 2 W/kg for 6 minutes [1.5 T] and for 15 minutes [3 T]).

▲ Precautions:

The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson&Johnson

Synthes GmbH
Eimattstrasse 3
4436 Oberdorf
Switzerland
Tel: +41 61 965 61 11

www.depuysynthes.com

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