LCP Medial Proximal Tibial Plate 4.5/5.0

Part of the DePuy Synthes 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

Table of Contents

■ **Notes**
▲ **Precautions**
▲ **WARNINGS**

LCP Medial Proximal Tibial Plate 4.5/5.0

Part of the DePuy Synthes LCP periarticular plating system

The LCP Medial Proximal Tibial Plate 4.5/5.0 is part of the DePuy Synthes LCP periarticular plating system, which merges locking screw technology with conventional plating techniques.

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.

LCP Medial Proximal Tibial Plate

The low profile LCP Medial Proximal Tibial Plate 4.5/5.0 is available in stainless steel and titanium. The head and neck portions of the plate accept 5.0 mm cannulated locking screws and 5.0 mm cannulated conical screws. The screw hole pattern facilitates a raft of subchondral locking screws to buttress the tibial plateau.

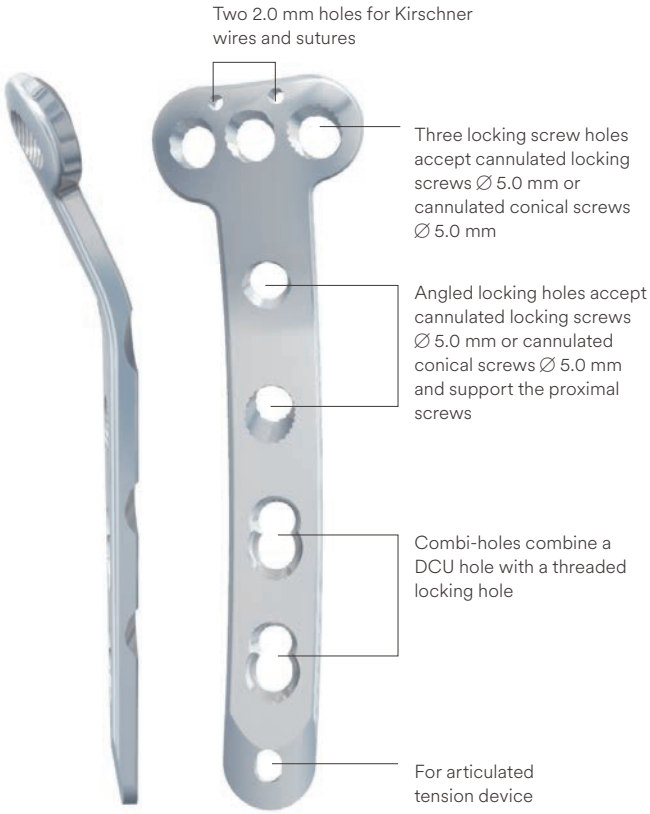
Plate head

- Anatomically contoured to approximate the anteromedial proximal tibia.
- Three convergent threaded screw holes accept cannulated locking screws ∅ 5.0 mm or cannulated conical screws ∅ 5.0 mm.
- Two 2.0 mm holes for preliminary fixation with Kirschner wires, or meniscal repair with sutures.

Plate shaft

- The two angled locking holes distal to the plate head accept cannulated locking screws ∅ 5.0 mm or cannulated conical screws ∅ 5.0 mm to secure the plate position. The hole angles allow the locking screws to converge with two of the three screws in the plate head.
- Combi-holes, distal to the angled locking holes, combine a DCU hole with a threaded locking hole. The combi-holes accept locking screws ∅ 5.0 mm in the threaded portion of the hole and cortex screws ∅ 4.5 mm in the DCU portion of the hole.
- Available with 4, 6, 8, 10, 12, 14, or 16 combi-holes in the plate shaft.

Available in left and right plates



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

The AO Principles of Fracture Management

Mission

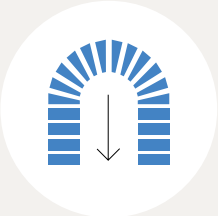
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

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.

Surgical Technique

1. Preparation and preoperative planning

Required sets
Plate Set LCP Medial Proximal Tibial Plates 4.5 / 5.0
Periarticular LCP Plating System Instrument Set
Cannulated Conical and Cannulated Locking Screw Set ∅ 5.0 and 7.3 mm
LCP Large Fragment Instrument Set
LCP Large Fragment Screw Set

1 Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine plate length and instruments to be used.

■ Note:

Determine proximal screw placement and screw lengths to ensure proper screw placement in the metaphysis.

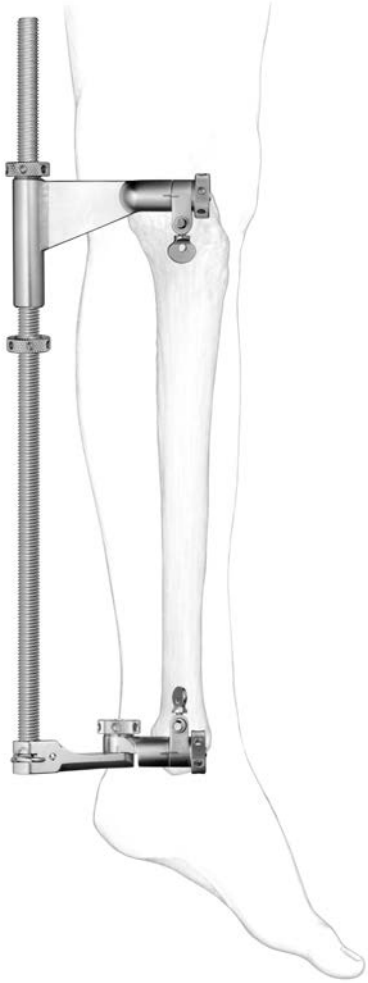
Position the patient supine on a radiolucent operating table. Visualization of the proximal tibia under fluoroscopy in both the lateral and AP views is necessary.

■ Note:

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

2. Reduce articular surface

Optional instruments	
117.700	Instrument Set for Large Distractor in Sterilization Tray
01.301.000	Large External Fixator in Vario Case
394.350	Large Distractor



■ Note:

Prior to reduction, application of an external fixator or large distractor may facilitate visualization and reduction of the joint.

Reduce the fracture fragments and confirm reduction using image intensification. Fragments may be reduced using independent Kirschner wires; however, Kirschner wire holes are also provided on the plate for reduction, plate position, or fixation.

The locking screws do not provide interfragmentary or plate-to-bone compression; therefore, any desired compression must be achieved with traditional lag screws or cannulated conical screws ∅ 5.0 mm. The articular fragments must be reduced and compression must be obtained prior to applying the LCP Medial Proximal Tibial Plate with locking screws.

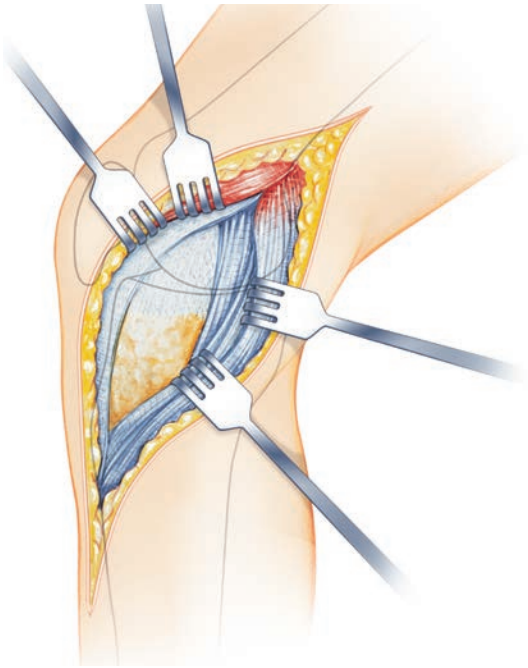
■ Note:

To verify that independent lag screws will not interfere with plate placement, hold the plate to the bone.

Apply the distractor to assist in the visualization and reduction of the joint.

3. Determine plate position

1. Using anatomic landmarks and fluoroscopy, mount the plate on the intact or reconstructed plateau without attempting to reduce the distal portion of the fracture.



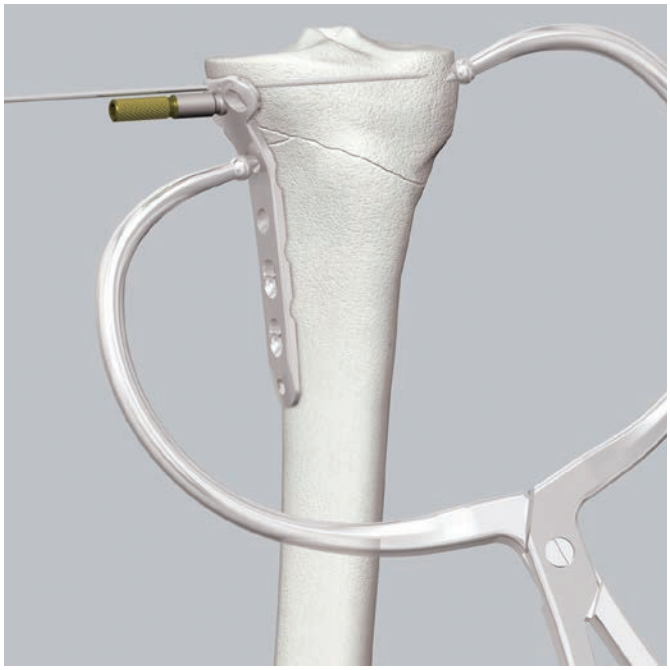
Mount the plate

Instruments	
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm
292.210	Kirschner Wire ∅ 2.0 mm with trocar tip

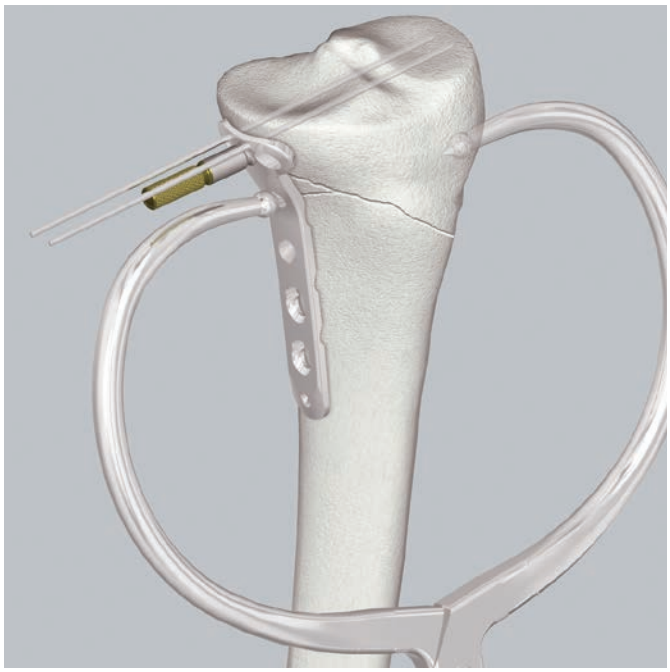
Attach a wire guide to the central hole in the head of the plate. Insert a Kirschner wire ∅ 2.0 mm through a Kirschner wire hole.

▲ Precautions:

- Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.
- Handle devices with care and dispose worn bone cutting instruments in an approved sharps container.

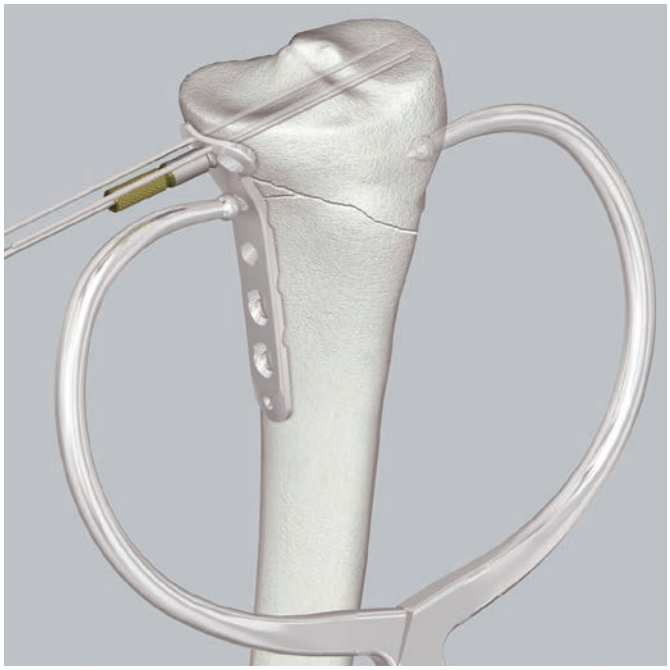


Readjust the plate position, if necessary. Place a second wire in the other Kirschner wire hole to prevent rotation of the plate and to secure provisional fixation of the plate to the tibial plateau.



4. Insert proximal provisional (conical) screw

Instruments	
310.243	Guide Wire ∅ 2.5 mm, with drill tip
319.701	Measuring Device for Cannulated Locking Screws and Cannulated Conical Screws ∅ 5.0 and 7.3 mm
For predrilling in dense bone	
310.634	Drill Bit ∅ 4.3 mm, cannulated, with Quick Coupling



Insert guide wire

While the plate is placed against the bone, insert the guide wire ∅ 2.5 mm through the wire guide in the central screw hole in the plate head. The use of fluoroscopy while drilling helps to visualize screw trajectory and screw placement. Advance the guide wire through to the lateral cortex or to the desired screw tip location.

Determine proper screw trajectory by using clinical examination and fluoroscopy to confirm:

- Guide wire trajectory in the proximal locking hole is parallel to the joint and the reduction is maintained.
- Screw and plate placement will be consistent with the preoperative plan.
- Alignment of the plate to the shaft of the tibia is correct in both the AP and lateral views. Placement of the plate at this point will determine final flexion/extension.

Measure screw length

Measure for screw length using the measuring device for cannulated screws.

Notes:

- The measuring device must contact the end of the wire guide for an accurate measurement.
- Predrilling in dense bone
  The self-drilling, self-tapping flutes of the cannulated conical screws ∅ 5.0 mm make predrilling and pretapping unnecessary in most cases. If necessary, in dense bone, the lateral cortex can be predrilled with the cannulated drill bit ∅ 4.3 mm.

Insert proximal cannulated (conical) screw

Instruments	
314.050	Screwdriver, hexagonal, cannulated
338.490	Quick Coupling
314.230	Screwdriver Shaft, hexagonal, cannulated

Use the cannulated hexagonal screwdriver to remove the wire guide.

Insert the appropriate length cannulated conical screw ∅ 5.0 mm in the central hole in the plate head to pull the plate to the bone and gain interfragmentary compression through the plate by using a power tool with the quick coupling and the cannulated screwdriver shaft.

Perform final tightening by hand using the hexagonal cannulated screwdriver.

Notes:

- Insert a screw that is approximately 5 mm shorter than the measurement from the measuring device.
- When interfragmentary compression is desired, use cannulated conical screws ∅ 5.0 mm. Locking screws are not lag screws.

5. Secure plate to plateau

Instruments	
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm
310.243	Guide Wire B 2.5 mm, with drill tip
319.701	Measuring Device for Cannulated Locking Screws and Cannulated Conical Screws ∅ 5.0 and 7.3 mm
314.050	Screwdriver, hexagonal, cannulated

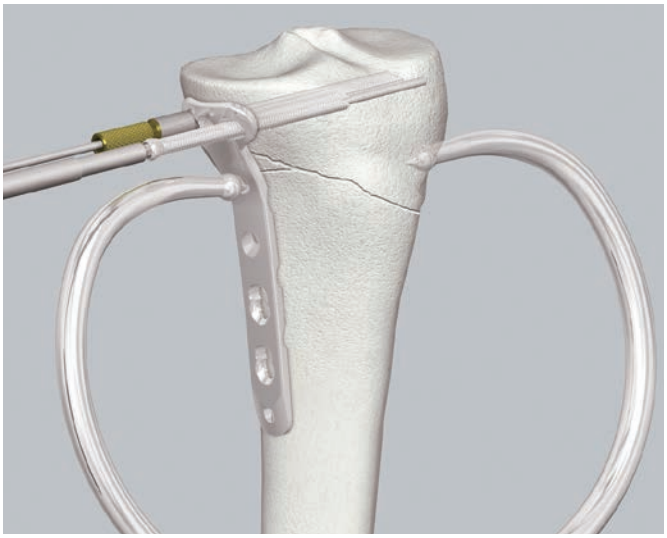
Attach wire guides to the anterior and posterior holes in the head of the plate. Insert guide wires ∅ 2.5 mm through these wire guides to the desired screw tip location.

Use the measuring device to measure for screw length. Use the hexagonal cannulated screwdriver to remove the wire guides.

Remove the Kirschner wires.

Insert cannulated locking screws

Instruments	
511.771 511.774	Torque Limiter, 4 Nm or Torque Limiter, 4 Nm, for AO/ASIF Quick Coupling for Reamers
338.490	Quick Coupling
314.230	Screwdriver Shaft, hexagonal, cannulated
For final tightening and locking	
397.705 397.706	Handle for Torque Limiter Nos. 511.770 and 511.771 or Handle for Torque Limiter No. 511.774
For predrilling in dense bone	
310.634	Drill Bit ∅ 4.3 mm, cannulated, with Quick Coupling



Insert the appropriate length cannulated locking screws ∅ 5.0 mm into the bone with a power tool using the torque limiter, the quick coupling and the hexagonal cannulated screwdriver shaft.

Perform final tightening by hand using the hexagonal cannulated screwdriver shaft together with the quick coupling, the torque limiter and the handle for torque limiter. After one click, the recommended torque is reached.

Notes:

- If the torque limiter is unavailable, do not tighten the screws to the plate using a power tool. Perform final tightening by hand.
- Predrilling in dense bone
  The self-drilling, self-tapping flutes of the cannulated locking screws ∅ 5.0 mm make predrilling and pretapping unnecessary in most cases. If necessary, in dense bone, the lateral cortex can be predrilled with the cannulated drill bit ∅ 4.3 mm.

Once both the anterior and posterior locking screws are securely locked to the plate, the central cannulated conical screw ∅ 5.0 mm may be removed and replaced with a third cannulated locking screw ∅ 5.0 mm.

6. Reduce shaft to tibial plateau

Instruments	
398.810	Bone Holding Forceps, self-centering, speed lock or
398.813	Plate Holding Forceps, with Swivel Foot
321.120	Tension Device, articulated

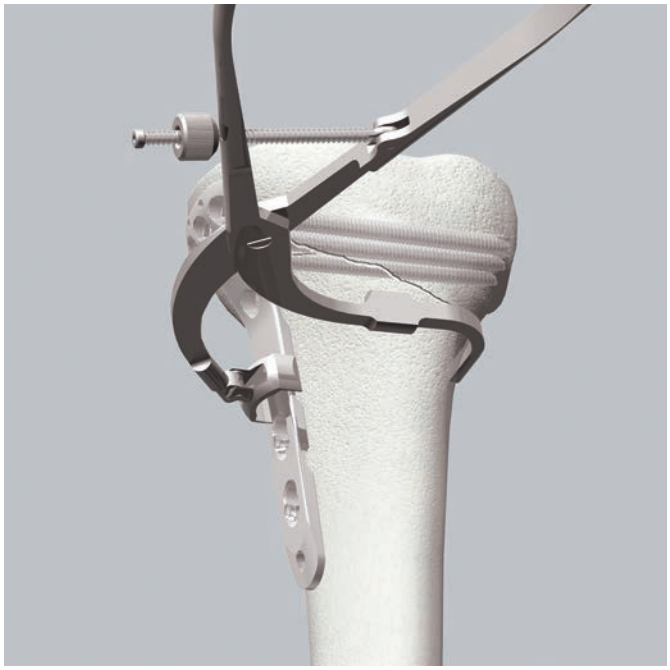
Reduce the tibial plateau to the shaft of the tibia, using indirect reduction techniques whenever possible. Secure the plate to the tibial shaft with bone holding forceps.

Confirm rotational alignment of the extremity by clinical examination.

Once reduction is satisfactory, and if it is appropriate based on the fracture morphology, the plate should be loaded in tension using the tension device.

■ Note:

With multifragmentary fractures, it may not always be possible or desirable to achieve anatomic reduction of the fracture. However, in simple fracture patterns, the tension device may facilitate anatomic reduction. This device may be used to generate either compression or distraction.

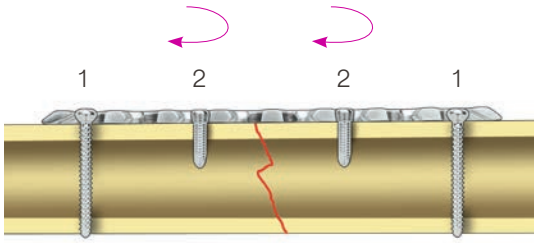


7. Insert screws in plate shaft

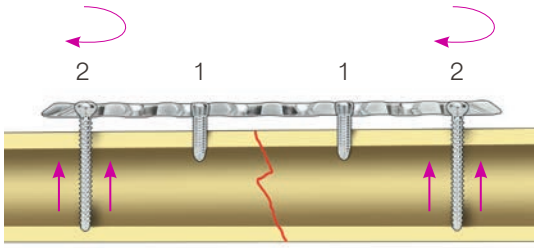
In addition to having threaded locking holes, the plate functions similarly to DCP plates. A combination of cortex screws and locking screws may be used.

Notes:

- If a combination of cortex (1) and locking screws (2) is used, a cortex screw should be inserted first to pull the plate to the bone.
- If locking screws (1) have been used to fix the plate to a fragment, subsequent insertion of a cortex screw (2) in the same fragment without loosening and retightening the locking screw is not recommended.



Correct



Incorrect

7a. Insert cortex screws

Instruments	
323.460	Universal Drill Guide 4.5 / 3.2
310.290	Drill Bit ∅ 3.2 mm, 2-flute, for Quick Coupling
319.100	Depth Gauge for Screws ∅ 4.5 to 6.5 mm
03.400.102	Screwdriver Shaft 3.5, hexagonal, Stardrive SD25
03.400.112	Handle for Screwdriver Shaft 3.5, hexagonal, Stardrive SD25

Insert as many self-tapping cortex screws ∅ 4.5 mm as necessary into the distal portion of the plate.

■ Note:

All of the cortex screws ∅ 4.5 mm must be inserted prior to insertion of locking screws ∅ 5.0 mm.

Use the universal drill guide to predrill for the cortex screws and drill through both cortices with the drill bit ∅ 3.2 mm. For the neutral position, press the drill guide down in the nonthreaded hole. To obtain compression, place the drill guide at the end of the nonthreaded hole away from the fracture. Do not apply downward pressure on the drill guide's spring-loaded tip.

Measure for screw length using the depth gauge.

Select and insert the appropriate length cortex screw ∅ 4.5 mm. Perform final tightening by hand using the screwdriver shaft together with the handle for the screwdriver shaft.

7b. Insert locking screws

Instruments	
323.042	LCP Drill Sleeve 5.0, for Drill Bits ∅ 4.3 mm
310.430	LCP Drill Bit ∅ 4.3 mm with Stop
319.100	Depth Gauge for Screws ∅ 4.5 to 6.5 mm
314.119	Screwdriver Shaft Stardrive 4.5 / 5.0, SD25
or	
314.150	Screwdriver Shaft, hexagonal, ∅ 3.5 mm
511.771 511.774	Torque Limiter, 4 Nm or Torque Limiter, 4 Nm, for AO/ASIF Quick Coupling for Reamers
For final tightening and locking	
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771 or
397.706	Handle for Torque Limiter No. 511.774

Attach the LCP drill sleeve to the locking hole in the plate shaft. Drill a hole using the LCP drill bit ∅ 4.3 mm.

■ Note:

Use of the drill sleeve is mandatory for screws to lock to the plate properly.

Remove the drill sleeve and determine the screw length with the depth gauge. Alternatively, read the drilled depth directly from the laser mark on the drill bit by shoving the stop ring down to the drill sleeve to make reading visible.

Insert the appropriate length locking screw ∅ 5.0 mm by using a power tool with the torque limiter and the screwdriver shaft.

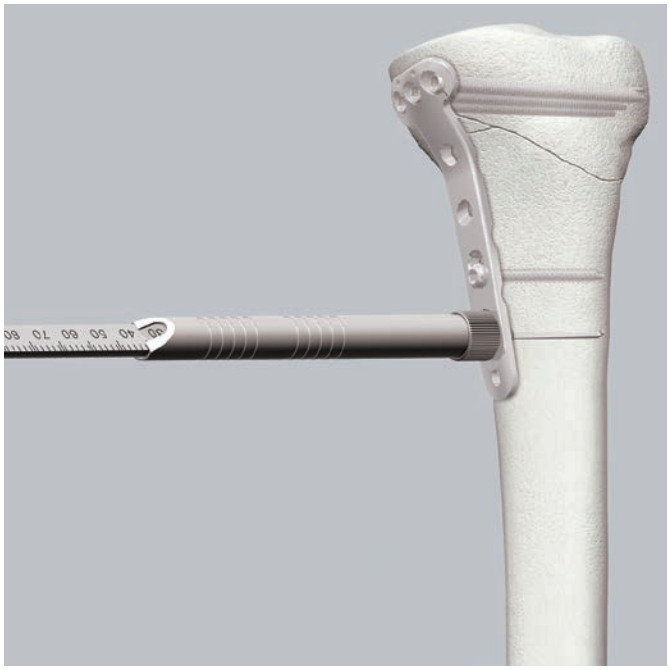
Perform final tightening by hand using the screwdriver shaft together with the torque limiter and the handle for torque limiter. After one click, the recommended torque is reached.

Repeat as necessary to insert additional locking screws.

■ Note:

If the torque limiter is unavailable, do not tighten the screws to the plate using power. Perform final tightening by hand.

Examine the limb clinically and radiographically. It is important that the tibial plateau is in proper orientation to the tibial shaft.



8. Insert cannulated locking screws in angled holes

Instruments	
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm
310.243	Guide Wire ∅ 2.5 mm, with drill tip
319.701	Measuring Device for Cannulated Locking Screws and Cannulated Conical Screws ∅ 5.0 and 7.3 mm
314.050	Screwdriver, hexagonal, cannulated
511.771 511.774	Torque Limiter, 4 Nm or Torque Limiter, 4 Nm, for AO/ASIF Quick Coupling for Reamers
338.490	Quick Coupling
314.230	Screwdriver Shaft, hexagonal, cannulated
For final tightening and locking	
397.705 397.706	Handle for Torque Limiter Nos. 511.770 and 511.771 or Handle for Torque Limiter No. 511.774
For predrilling in dense bone	
310.634	Drill Bit ∅ 4.3 mm, cannulated, with Quick Coupling

■ Note:

Use the oblique locking positions to buttress a medial fragment.

If not already done, thread a wire guide into an angled locking hole. Insert a guide wire ∅ 2.5 mm through the wire guide. Advance the guide wire until it reaches the desired screw tip location.

Measure for screw length using the measuring device. The correct length measurement will place the screw tip at the tip of the guide wire. Use the hexagonal, cannulated screwdriver to remove the wire guide.

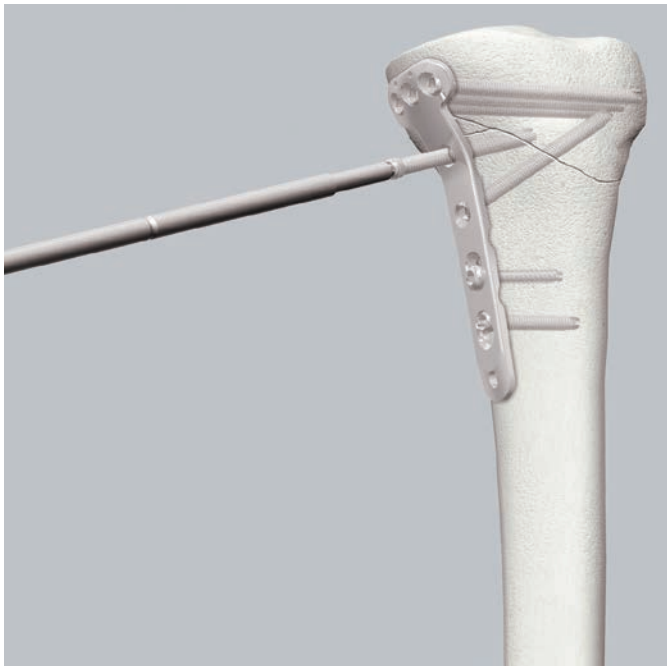
■ Note:

The measuring device must contact the end of the wire guide for an accurate measurement.

Insert the appropriate length cannulated locking screws ∅ 5.0 mm by using a power tool with the torque limiter, quick coupling and the hexagonal, cannulated screwdriver shaft.

Perform final tightening by hand using the hexagonal cannulated screwdriver shaft together with the quick coupling, the torque limiter and the handle for torque limiter. After one click, the recommended torque is reached.

Repeat steps for locking screw insertion for the remaining angled hole.

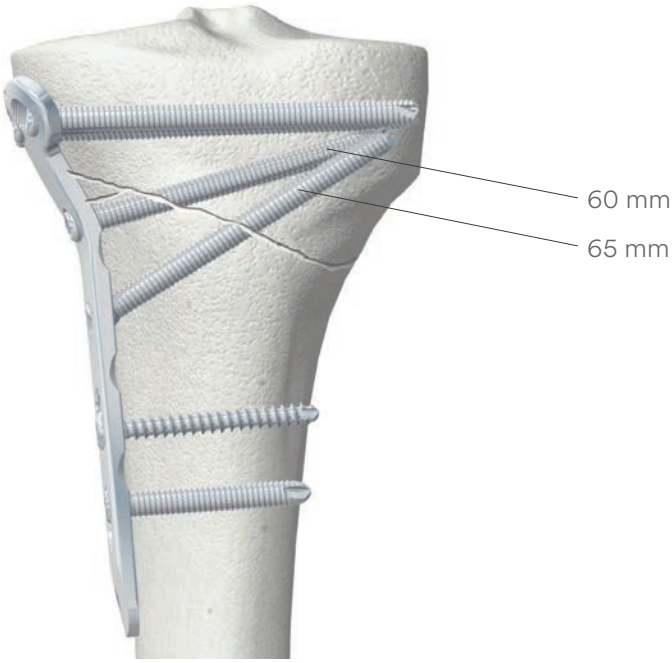


Notes:

- If the torque limiter is unavailable, do not tighten the screws to the plate using power. Perform final tightening by hand.
- Predrilling in dense bone: The self-drilling, self-tapping flutes of the cannulated locking screws ∅ 5.0 mm make predrilling and pretapping unnecessary in most cases. If necessary, in dense bone, the lateral cortex can be predrilled with the cannulated drill bit ∅ 4.3 mm.

Screw length considerations

When using the appropriate length screws in the angled locking holes, the screw tips should meet the proximal locking screws.



Suggested screw lengths to achieve desired screw convergence

Securely tighten all locking screws to lock them to the plate.

9. Implant removal

Unlock all screws from the plate, then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when unlocking the last locking screw.

For details regarding implant removal refer to the surgical technique “Screw Extraction Set”.

Instruments for Minimally Invasive Percutaneous Plate Osteosynthesis

Hohmann Retractor Holder

The Hohmann retractor holder enables the percutaneous insertion of plates. It can be used in combination with implant systems such as LCP and LISS.

- The Hohmann retractor holder allows visualization of the inserted plate.
- Serves as a guide for the inserted plate.
- Ensures that the inserted plate is centered on the bone.

For additional information see the separate DePuy Synthes publication on the Hohmann retractor holder.

Soft Tissue Retractor

The offset blade retracts soft tissue around epipereosteal cavity for percutaneous plate insertion.

- Adjustable blade for free choice of insertion angle and blade length
- Available in two sizes: for small and large fragment plates

For additional information see the separate DePuy Synthes publication on the Soft tissue retractor.

Plates

LCP Medial Proximal Tibial Plates 4.5/5.0

Steel	Pure Titanium (TiCP)	Holes (shaft)	Length (mm)	
239.984	439.984	4	106	right
239.986	439.986	6	142	right
239.988	439.988	8	178	right
239.990	439.990	10	214	right
239.992	439.992	12	250	right
239.994	439.994	14	286	right
239.996	439.996	16	322	right
239.985	439.985	4	106	left
239.987	439.987	6	142	left
239.989	439.989	8	178	left
239.991	439.991	10	214	left
239.993	439.993	12	250	left
239.995	439.995	14	286	left
239.997	439.997	16	322	left

All plates are available nonsterile and sterile packed. For sterile implants add suffix S to article number.

Screws

Cannulated Locking Screw ∅ 5.0 mm
(0X.205.025–0X.205.145)
- Threaded conical head
- Fully threaded shaft
- Self-drilling, self-tapping tip

Cannulated Conical Screw ∅ 5.0 mm
(0X.205.240–0X.205.295)
Compresses the plate to the lateral femoral condyle
- Smooth conical head
- Partially threaded shaft
- Self-drilling, self-tapping tip

Screw Nut ∅ 5.0 mm (X22.578)
- Self-cutting, serrated tip
- Inserted from the lateral aspect of the proximal tibia
- Internal threads mate with the 5.0 mm cannulated conical screws

See the LCP Condylar Plate 4.5/5.0 surgical technique for more information on use of the screw nut.

Locking Screw ∅ 5.0 mm
(⬢ X13.314–X13.390 / ⬢ X12.201–X12.227)
- Threaded conical head
- Fully threaded shaft
- Self-tapping tip

Cortex Screw ∅ 4.5 mm (X14.814–X14.940)
- May be used in the DCU portion of the combi-holes in the plate shaft
- Compresses the plate to the bone
- Self-tapping tip

X = 2: Stainless steel
X = 4: Titanium and titanium alloy (TAN)

Cannulated Locking and Cannulated Conical Screws ∅ 5.0 mm

Screw head

The conical head provides alignment in the plate hole. The threaded screw head must align with the plate hole threads to provide screw-plate construct. To ensure proper alignment and prevent cross-threading, the appropriate threaded wire guide or drill guide must always be used.

Large diameter screw core

The large diameter screw core distributes the load over a larger area in the bone.

Thread profile

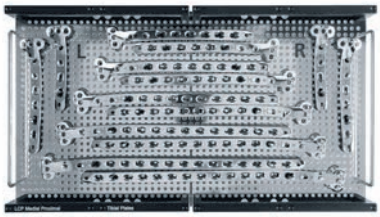
The shallow thread profile of the locking screws is necessary to provide a larger core. This is appropriate since locking screws do not rely on compression between the plate and the bone to maintain stability.

Drill and Wire Guides

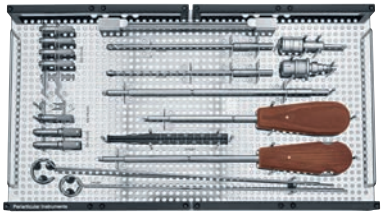
324.174	Wire Guide 5.0, for Guide Wire ∅ 2.5 mm Fits the screw holes in the plate head	
323.042	LCP Drill Sleeve 5.0, for Drill Bits ∅ 4.3 mm Fits the threaded part of the combi-holes in the plate shaft	
323.460	Universal Drill Guide 4.5/3.2 Fits the nonthreaded part of the combi-holes in the plate shaft	

Sets

Plate Set LCP Medial Proximal Tibial Plates 4.5/5.0 in Vario Case	
01.120.430	Stainless steel
01.120.431	Titanium
689.508	Vario Case
68.120.430	Insert
689.507	Lid



01.120.021	**Periarticular LCP Plating System Instrument Set in Vario Case**
68.120.447	Vario Case
68.120.445	Insert
689.507	Lid



Additionally required

01.120.457	**LCP Large Fragment Instrument Set**
68.120.457	Vario Case

LCP Screw Set ∅ 4.5/5.0 mm		
	Hexagonal recess	Stardrive recess
Stainless steel	01.200.011	01.200.013
Titanium	01.200.012	01.200.014

300.610	Sterilization Tray

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-14 and ASTM F2119-07

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 F2182-11a

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.

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