

LCP Hook Plate 3.5. The simple fixation system for tension band plating.

Technique Guide

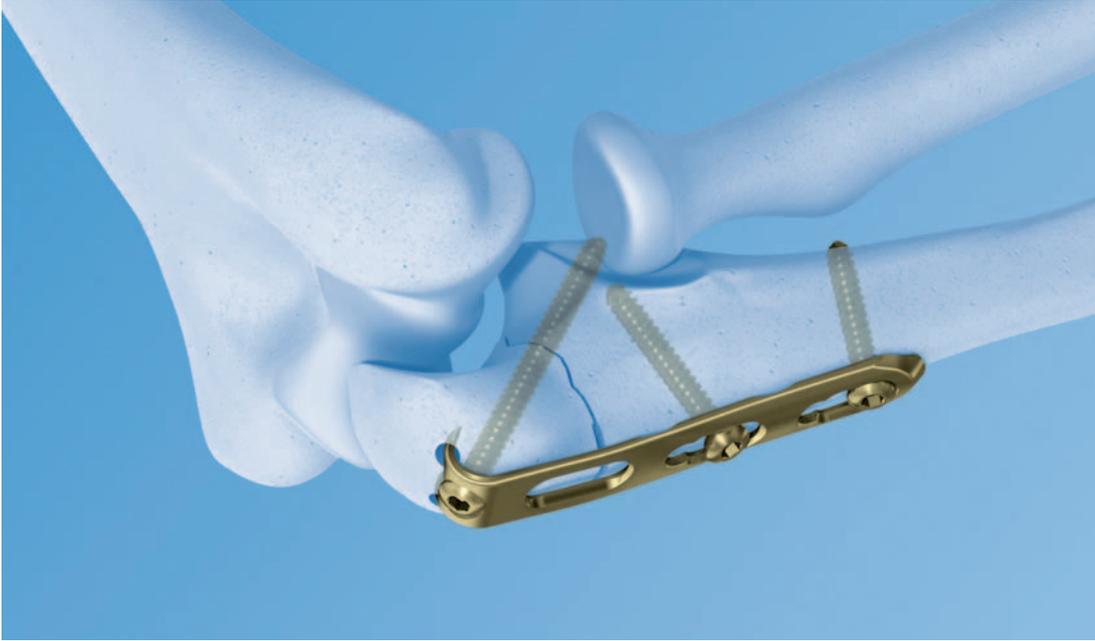


Table of Contents

Introduction	LCP Hook Plate 3.5	2
	AO Principles	4
	Indications	5
Surgical Technique	Implantation	6
	Implant Removal	18
Product Information	Implants	20
	Instruments	21
	Sets	22
Bibliography		23

 Image intensifier control

Warning

This description alone does not provide sufficient background for direct use of the instrument set. Instruction by a surgeon experienced in handling these instruments is highly recommended.

Reprocessing, Care and Maintenance of Synthes Instruments

For general guidelines, function control and dismantling of multi-part instruments, please refer to: www.synthes.com/reprocessing

LCP Hook Plate 3.5. The simple fixation system for tension band plating.

Features and Benefits

Tension band plating

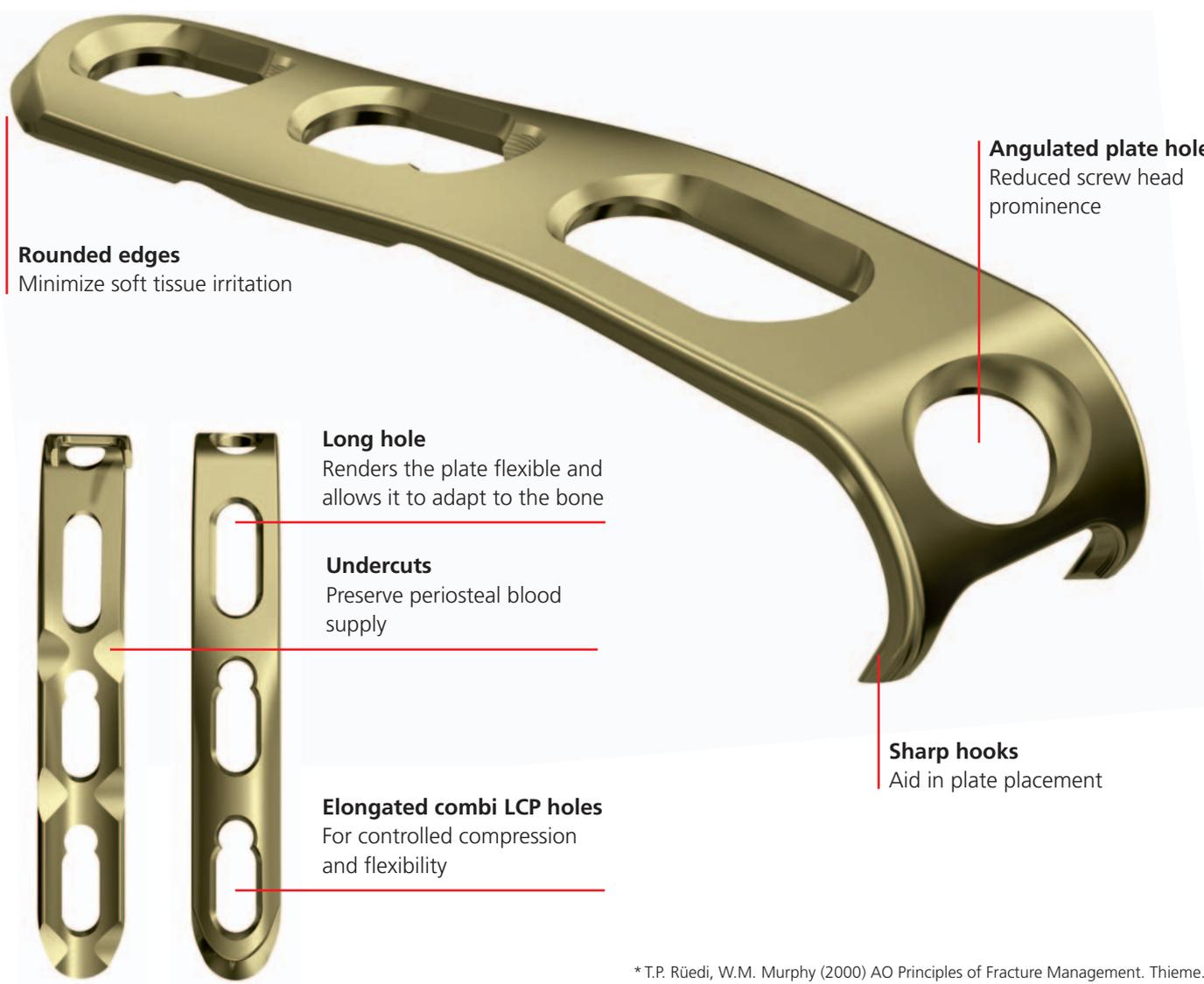
- Elongated LCP-holes make the plate and its placement more flexible and allow for controlled compression
- The spring effect facilitates reduction and a stable tension band technique
- Hooks allow optimal fixation in small bone fragments and increase stability
- LCP technology for increased stability in osteoporotic bone

Simple and proven solution

- State of the art solution for a commonly performed one third tubular plate modification*
- Intuitive and easy-to-perform technique
- No left and right version minimizes inventory

Soft tissue friendly

- The flexible one third tubular plate design facilitates an anatomic fit while presenting a low profile for minimal hardware prominence



* T.P. Rüedi, W.M. Murphy (2000) AO Principles of Fracture Management. Thieme.

Part of the modular Synthes LCP Elbow System

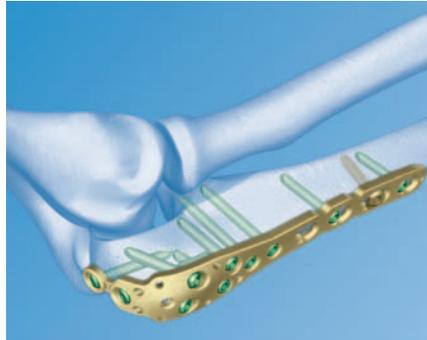


LCP Hook Plate 3.5

- Pre-shaped hooks for fast and easy application
- Small inventory, no left and right version needed

Indications

- Simple fractures of the olecranon (AO Types 21–B1, 21–B3, 21–C1)
- Osteotomies of the olecranon for distal humerus fracture treatment
- Avulsion fractures of the distal tibia and fibula



LCP Olecranon Plates 3.5

- Left and right version
- Choice of six lengths with 2, 4, 6, 8, 10 or 12 LCP combi-holes in the shaft
- Proximal portion of the plate with 8 locking holes allows to set a maximum number of locking screws. Guide block for easy and correct insertion.

Indications

- Complex extra- and intra-articular fractures of the olecranon
- Nonunions of the proximal ulna



LCP Distal Humerus Plates

- Dorsolateral plates with and without support
- Medial plates
- All plates in a left and right version
- All plates in five lengths: 3, 5, 7, 9 and 14 holes
- Anatomically precontoured: no or only minimal bending necessary
- Extensive options for fixation
- Guide block for easy and correct insertion

Indications

- Intra-articular fractures of the distal humerus, especially for osteoporotic bone
- Supracondylar fractures of the distal humerus
- Nonunions of the distal humerus

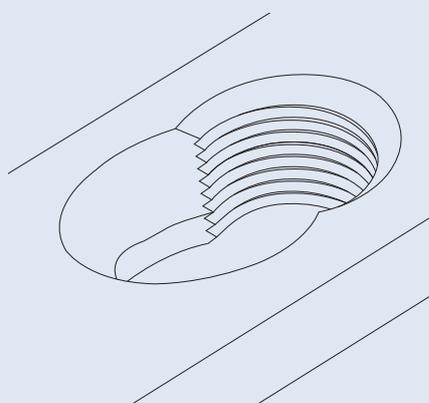
LCP Locking Compression Plate

Angular stable fixation of fragments regardless of bone quality

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

Reduced impairment of periosteal blood supply due to the limited plate contact

Good purchase also in osteoporotic bone and in multifragment fractures



LCP combi-hole

Intraoperative choice between compression and angular stable locking

With standard screws:
interfragmental or dynamic-axial compression

With locking screws:
stable plate-screw connection without loss of reduction, regardless of plate modelling

AO Principles

In 1958, the AO formulated four basic principles¹, which have become the guidelines for internal fixation:

Anatomic reduction

The plate with its hooks, its pre-bent shape and its elongated combi-holes facilitates anatomic reduction.

Stable fixation

The plate hooks and the spring-effect on the dorsal cortex provide an optimal tension band mechanism.

Preservation of blood supply

The plate design preserves the blood supply through minimal plate to bone contact and due to a reduced number of screws. Furthermore, the plate design permits indirect reduction, thus resulting in reduced soft-tissue stripping.

Early mobilization

The LCP Hook Plate 3.5, combined with the AO technique, provides stable fracture fixation with minimal damage to vascular supply. This helps improve the environment for bone healing, accelerating the patient's return to mobility and function.

¹M.E. Müller, M. Allgöwer, R. Schneider, and H. Willenegger (1991) AO Manual of Internal Fixation, 3rd Edition. Berlin: Springer.

Indications

-
- Simple fractures of the olecranon
(AO Types 21–B1, 21–B3, 21–C1)
 - Osteotomies of the olecranon for distal humerus fracture treatment
 - Avulsion fractures of the distal tibia and fibula

Implantation

Notes

- Familiarity in the use of LCP plates or instruction from an experienced surgeon is recommended (see the Synthes Technique Guide for LCP Plates, Art. No. 036.000.019).
- This technique describes the application of the LCP Hook Plate 3.5 on the olecranon. The technique can also be used in a similar manner on the distal tibia and the fibula.

1

Position the patient

Place the patient in lateral decubitus with the elbow flexed over a side rest.

A small padded table can be placed under the forearm to support the elbow in extension if necessary.



2

Surgical approach

Perform a posterior midline incision centered over the fracture or osteotomy site.



3

Prepare olecranon

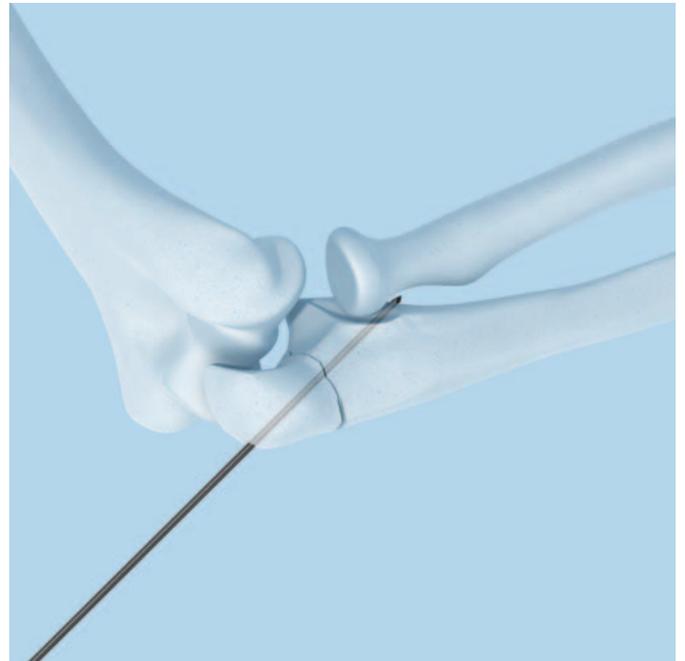
3a

For fractures: Reduce the fracture

Instrument

292.710	Kirschner Wire Ø 1.6 mm with threaded tip, length 150/5 mm, Stainless Steel
---------	---

- Reduce the fracture directly or indirectly depending on the type of fracture. Temporarily fix the fragment using Kirschner wires and/or forceps. Examine the reduction of the olecranon using image intensification. Ensure that Kirschner wires or forceps will not interfere with subsequent plate placement.



3b

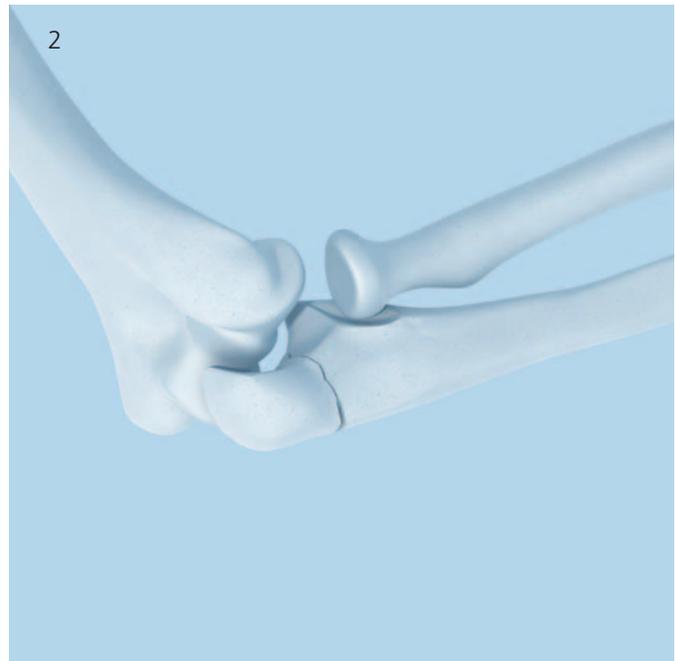
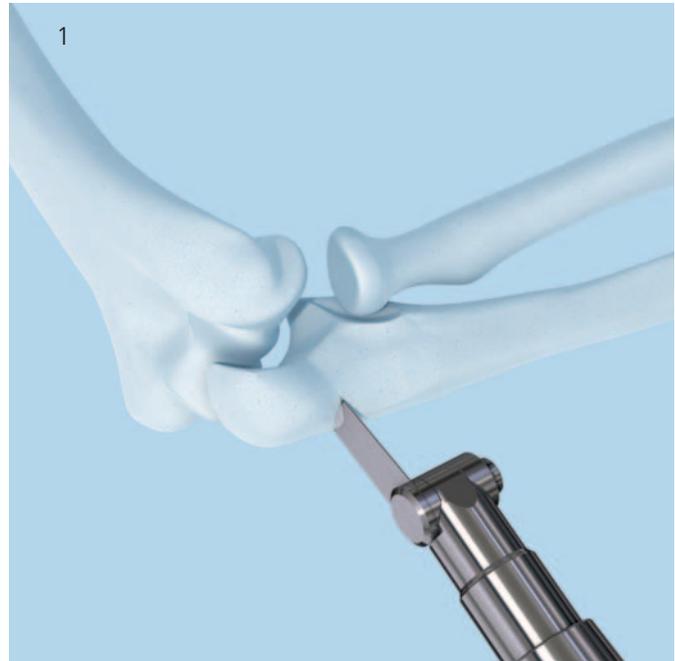
For osteotomies

Instrument

292.560	Kirschner Wire \varnothing 1.6 mm with double tip, length 150 mm, Stainless Steel
---------	---

Perform an incomplete osteotomy of the dorsal cortex of the olecranon using a thin oscillating saw blade to allow access to the distal humerus (1).

Complete the osteotomy with a chisel in order to obtain an interdigitating fracture line. The fracture line should ideally run through the bare area of the sigmoid notch (2).



Following the osteotomy, the olecranon fragment is tipped over to the lateral side.

Protect the ulnar nerve on the medial side as well as the muscular branch to the anconeus on the lateral side.

Perform surgery on the distal humerus as required.

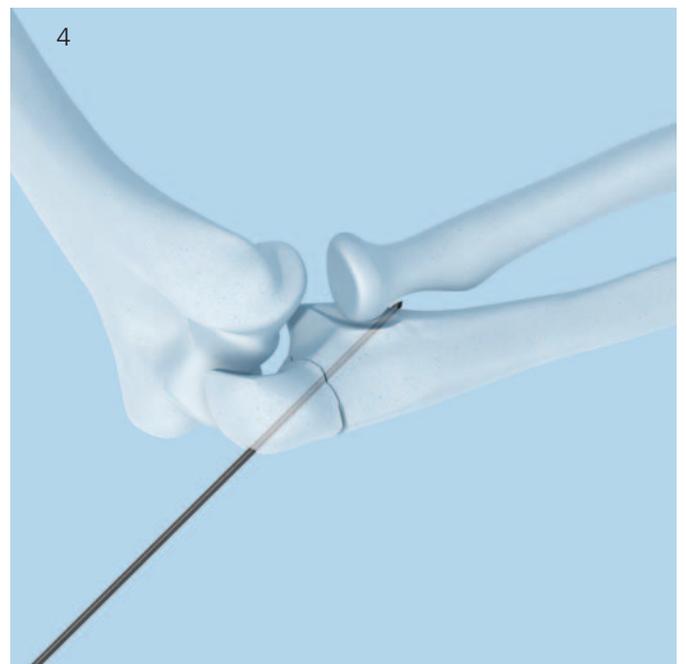
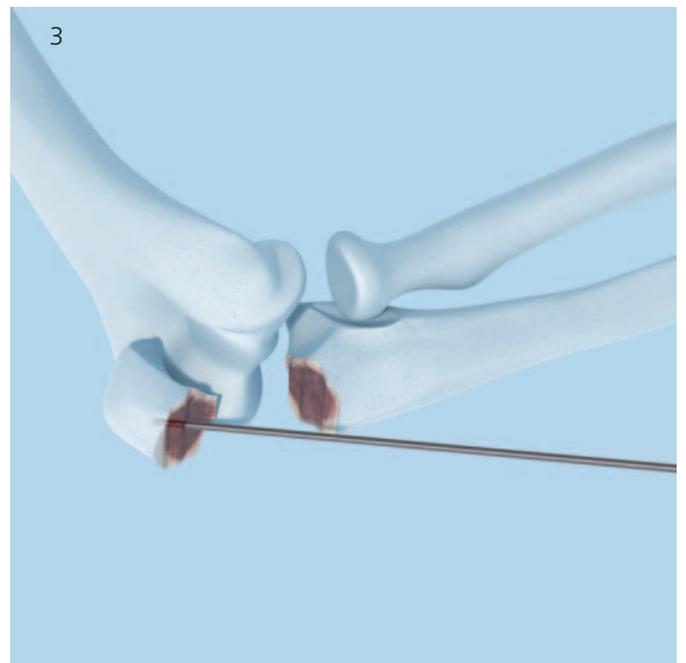
Insert a 1.6 mm double-tipped Kirschner wire into the proximal olecranon fragment (3).

The wire is inserted from distal to proximal starting close to the articular surface and ending at the distal insertion line of the triceps.

Reduce the olecranon. Check for anatomic interdigitation. Insert the Kirschner wire until it passes the cortex of the coronoid process medially (4).

Insert other Kirschner wires if additional preliminary stability is required.

Take care not to drill in a radial direction as the tip of the Kirschner wires and later the screw might interfere with forearm rotation.



4

Pre-drill holes for hooks

Instrument

310.210	Drill Bit \varnothing 2.0 mm, length 125/100 mm, 2-flute, for Quick Coupling
---------	--

Drill two holes for later hook placement using the plate as a guide. The holes should lie about 4 mm proximal to the insertion line of the triceps and be well centered over the olecranon.

Note: The holes are drilled through longitudinal splits in the tendon fibers.



5

Place the LCP Hook Plate 3.5

Instruments

OX.113.103	LCP Hook Plate 3.5, 3 holes, length 62 mm
------------	--

X=2: Stainless Steel
X=4: TAN

Optional instruments

03.100.031	Bending Pliers for Reconstruction Plates 3.5
329.150	Bending Pliers for Plates 2.4 to 4.0, length 230 mm
329.040/ 329.050	Bending Irons for Plates 2.4 to 3.5, length 145 mm

Place the plate on the olecranon, sinking the hooks into the appropriate pre-drilled holes. Align the plate with the axis of the proximal ulna. Consider the physiological varus bend of the proximal third of the ulna.

Note: If required, the plate shaft can be bent with the above mentioned instruments.

Important

- To prevent the locking section of the screw hole from being deformed, do not bend the plate over the locking holes.
 - The plate hooks must not be bent.
 - When placing the LCP Hook Plate 3.5, pay attention to not damage the surgical gloves or the patient's surrounding soft tissue with the sharp hooks.
-



Screw insertion in the following steps is referred to by a position number on the plate. This diagram shows the plate with the screw insertion holes identified by position and a number.

6

Temporary fixation of the plate

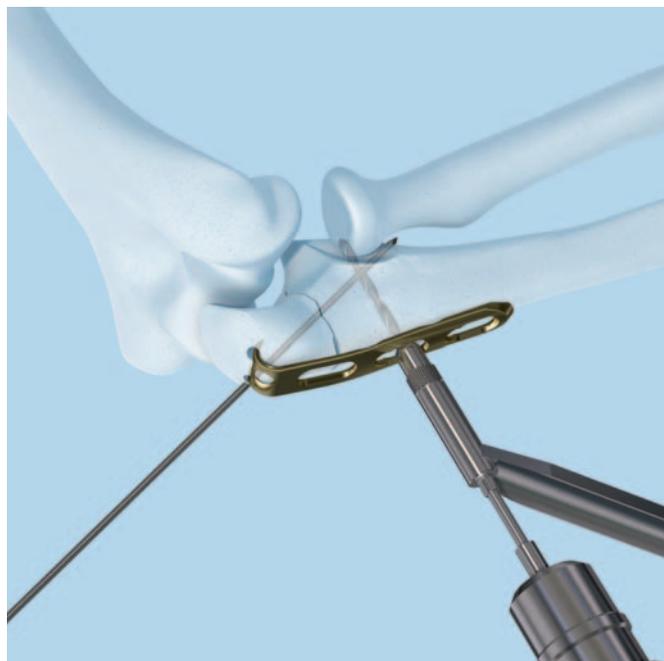
Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit \varnothing 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws \varnothing 2.7 to 4.0 mm
314.030	Screwdriver Shaft, hexagonal, small, \varnothing 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling

Drill a hole in the DCU (Dynamic Compression Unit) portion of the middle elongated combi-hole (position two) of the plate, ensuring that the drill will not collide with the reduction Kirschner wires.

Make sure that the screw is angled slightly off the central plate plane to avoid collision with the subsequent proximal screw.

Measure the depth. Insert a 3.5 mm cortex screw of appropriate length. Do not fully tighten the screw.



7

Apply compression

Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
398.800	Bone Holding Forceps, self-centering, speed lock, length 190 mm
or	
399.091	Bone Holding Forceps, self-centering, soft lock, length 191 mm
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling

Drill a screw hole approximately 20 mm from the end of the plate, through the near cortex. The screw hole should be aligned with the centerline of the plate.

Insert a 3.5 mm cortex screw but do not fully tighten it.

Apply compression outside the plate using a bone holding forceps and the 3.5 mm cortex screw. Tighten the previously inserted 3.5 mm cortex screw in the middle elongated combi-hole of the plate.



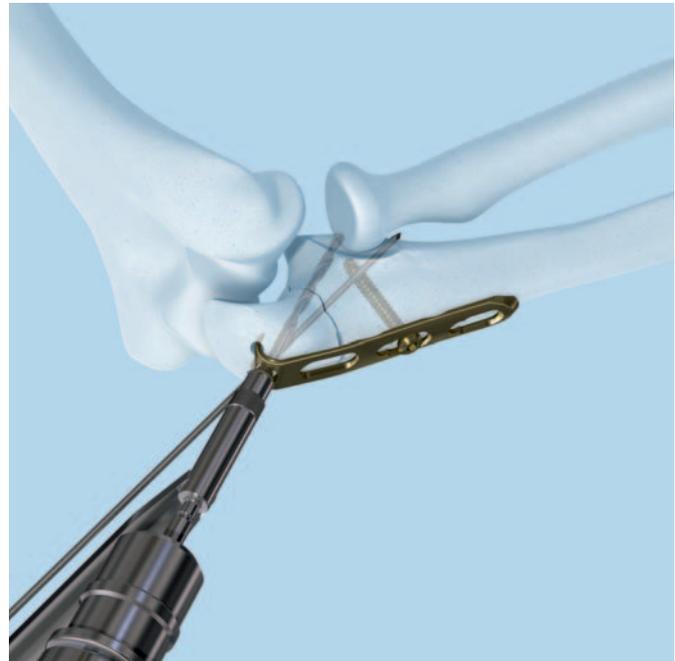
8

Place screw in position one

Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit \varnothing 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws \varnothing 2.7 to 4.0 mm
314.030	Screwdriver Shaft, hexagonal, small, \varnothing 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling

Drill the hole for the screw in position one (the most proximal hole) with a 2.5 mm drill bit. Drill towards the coronoid process, exiting medial to the radial articulation surface.



Measure the depth.

Again, ensure that the drill does not collide with the reduction Kirschner wires.

Insert and tighten a 3.5 mm cortex screw of appropriate length.

Note: The screw should be placed bicortically running close to the articular surface.

Remove the forceps and the independent 3.5 mm cortex screw that had been used to apply compression.

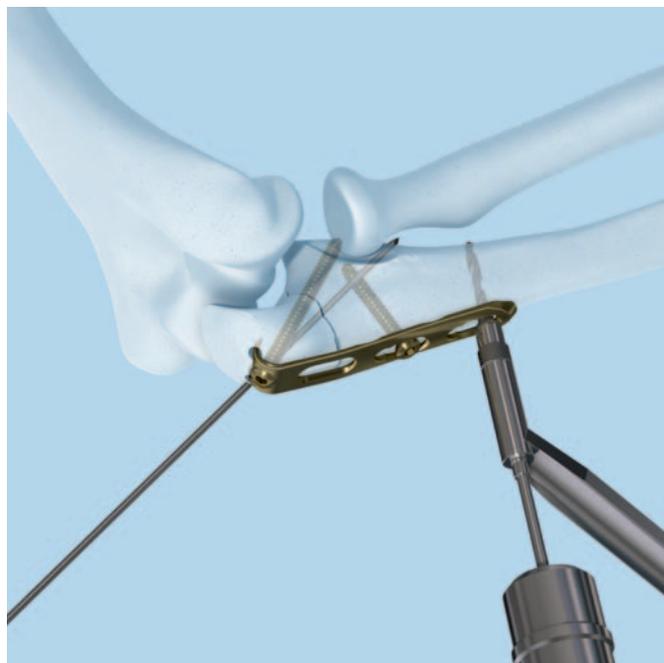


9

Place screw in position three

Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling

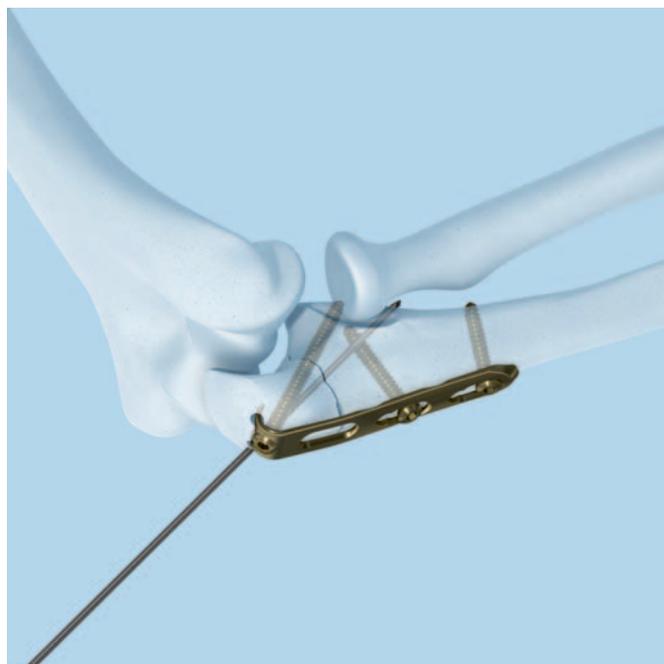


Optional instruments

323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
310.284	LCP Drill Bit Ø 2.8 mm, length 165 mm, 2-flute, for Quick Coupling
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling

For optimal stability, place a screw in position three (distal hole).

Note: for added stability, the screw is preferably placed obliquely pointing away from the plate. Alternatively, locking screws may be used instead of cortical screws in position two and three.



To insert a locking screw, carefully screw the LCP drill sleeve into the threaded part of the desired combination hole until the thread completely engages in the plate. Pre-drill the screw hole with the 2.8 mm drill bit. Remove the drill sleeve. Determine the screw length with the depth gauge.

Insert the screw manually or using a power tool. Always use the torque limiter to restrict the maximum torque. A distinct click can be heard when the maximum torque is reached, indicating a secure fit.

Remove the Kirschner wire.



Implant Removal

Instruments

314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
309.521	Extraction Screw for Screws Ø 3.5 mm
311.431	Handle with Quick Coupling

To remove the plate, first release all the screws without removing them.

Note: Remove the plate as a second step since it could otherwise rotate while unlocking the last screw.

If a screw cannot be released with the screwdriver, use the extraction tools (for additional information, see Handling Technique for Screw Extraction Set 036.000.918).

Important: For problem-free removal of an implant, the proper instruments must be available.



Implants

LCP Hook Plates 3.5

02.113.103 LCP Hook Plate 3.5, 3 holes, length 62 mm, Stainless Steel

04.113.103 LCP Hook Plate 3.5, 3 holes, length 62 mm, Pure Titanium



The implants are available sterile packed. For sterile implants add suffix "S" to article number.

Screws

The LCP Hook Plate 3.5 can be used with Locking Screws \varnothing 3.5 mm and Cortex Screws \varnothing 3.5 mm:

X12.102-124 Locking Screws \varnothing 3.5 mm, length 12–60 mm, self-tapping, with Stardrive recess



X13.012-060 Locking Screws \varnothing 3.5 mm, length 12–60 mm, self-tapping, with hexagonal recess

X04.814-860 Cortex Screws \varnothing 3.5 mm, length 14–60 mm, self-tapping, with hexagonal recess



All screws are available sterile packed. For sterile implants add suffix "S" to article number.

X=2: Stainless Steel
X=4: Titanium

Kirschner wires

292.560 Kirschner Wire \varnothing 1.6 mm with double tip, length 150 mm, Stainless Steel

292.710 Kirschner Wire \varnothing 1.6 mm with threaded tip, length 150/5 mm, Stainless Steel



Instruments

Drill bits

310.210	Drill Bit \varnothing 2.0 mm, length 125/100 mm, 2-flute, for Quick Coupling
---------	---



Optional instruments for contouring

03.100.031	Bending Pliers for Reconstruction Plates 3.5
------------	---

or



329.150	Bending Pliers for Plates 2.4 to 4.0, length 230 mm
---------	--

or



329.040	Bending Iron for Plates 2.4 to 3.5, length 145 mm
---------	--



used with

329.050	Bending Iron for Plates 2.4 to 3.5, length 145 mm
---------	--



Sets

Modular elbow sets

01.104.008	Tray for LCP Elbow Plates 3.5/2.7 (Stainless Steel), for Vario Case, filled
01.104.005	Tray for LCP Elbow Plates 3.5/2.7 (Pure Titanium), for Vario Case, filled
68.104.005	Tray for LCP Elbow Plates 3.5/2.7, for Vario Case, without content

Modular tray for preshaped plates

68.112.012	Modular Small Fragment Preshaped LCP Plates Tray
------------	--

Modular small fragment instrument trays

68.122.013	Modular Small Fragment Basic Instrument Tray
68.122.019	Modular Small Fragment Bending Instrument Tray
68.122.014	Modular Small Fragment Reduction Instrument Tray
68.122.015	Modular Small Fragment Screw Insertion Tray

Optional sets

105.900	Bone Forceps Set
01.900.022	Extraction Module for Screws \varnothing 3.5, 4.0 and 4.5 mm

Bibliography

Hak DJ, Golladay GJ. Olecranon Fractures: Treatment Options. *J Am Acad Orthop Surg* 2000;8:266-275

Heim D, Niederhauser K: Die Drittelrohrhakenplatte – One-Third Tubular Hook Plate. *Oper Orthop Traumatol* 2007;19:305-9

Hewins EA, Gofton WT, Dubberly J, et al: Plate Fixation of Olecranon Osteotomies. *J Orthop Trauma* 2007;21:58-62

Hume MC, Wiss DA: Olecranon Fractures: A Clinical and Radiographic Comparison of Tension Band Wiring and Plate Fixation. *Clin Orthop*. 1992;285:229-235

Martínez Romero J, Miran A, Jensen CH: Complications and re-operation rate after tension-band wiring of olecranon fractures. *J Orthop Sci* 2000;5:318-320

Tejwani NC, Garnham IR, Wolinsky PR, et al: Posterior Olecranon Plating: Biomechanical and Clinical Evaluation of a New Operative Technique. *Bull Hosp for Jt Dis* 2002-2003;61(1&2), 27-31

Rommens PM, Schneider RU, Reuter M: Functional Results after Operative Treatment of Olecranon Fractures. *Acta Chir Belg* 2004;104:191-197

Veillette CJH, Steinmann SP: Olecranon Fractures. *Orthop Clin N Am* 2008;39:229-236

Wang AA, Mara M, Hutchinson DT: The proximal ulna: An anatomic study with relevance to olecranon osteotomy and fracture fixation. *J Shoulder Elbow Surg* 2003;12:293-6



Synthes GmbH
Eimattstrasse 3
CH-4436 Oberdorf
www.synthes.com

All technique guides are available as PDF files at
www.synthes.com/lit



CE
0123