3.5 mm LCP® Proximal Humerus Plate

Stainless Steel and Titanium

TECHNIQUE GUIDE

Part of the Synthes Small Fragment LCP® System

SYNTHES®

Original Instruments and Implants of the Association for the Study of Internal Fixation — AO ASIF

The 3.5 mm LCP® Proximal Humerus Plate

The 3.5 mm LCP® Proximal Humerus Plate is part of the Small Fragment LCP System. This plate addresses complex fractures of the proximal humerus.

Indications

The 3.5 mm LCP Proximal Humerus Plate is indicated for fractures and fracture dislocations, osteotomies and nonunions of the proximal humerus, particularly for patients with osteopenic bone.

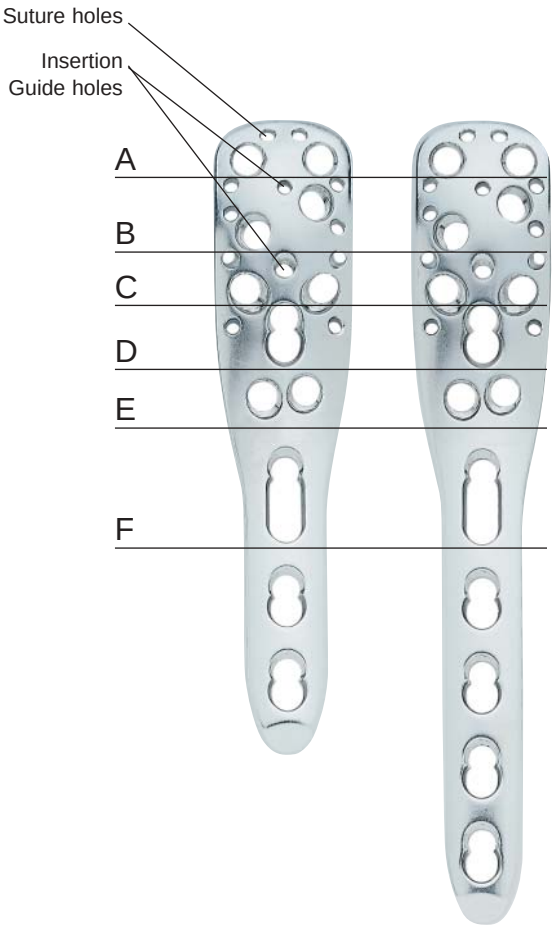
Preoperative X-ray of a proximal humerus fracture

Postoperative X-ray of a proximal humerus fracture treated with the 3.5 mm LCP Proximal Humerus Plate

Note: *For information on fixation principles using conventional and locked plating techniques, please refer to the* Small Fragment Locking Compression (LCP®) Technique Guide.

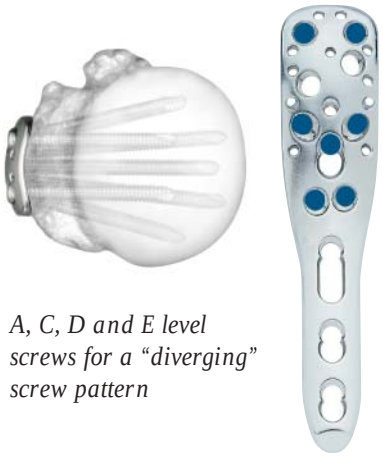
Features

- Anatomically-shaped
- Ten suture holes around the perimeter of the proximal end
- Proximal locking holes accept 3.5 mm Locking Screws
- Locked construct in humeral head (levels A–E)
- Distal shaft consists of three or five locking compression holes in the shaft, including one elongated hole to aid in plate positioning. These holes accept 3.5 mm Locking Screws in the threaded portion, and 3.5 mm Cortex Screws, 4.0 mm Cortex Screws, and 4.0 mm Cancellous Bone Screws in the compression portion.
- Available in stainless steel and titanium

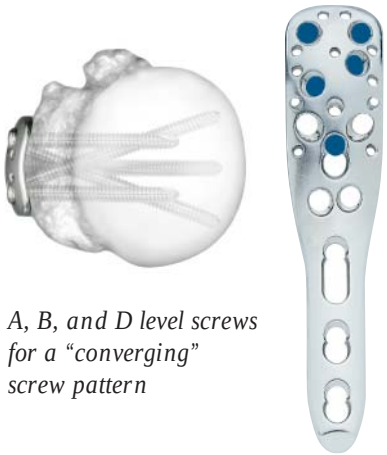


Proximal locking holes

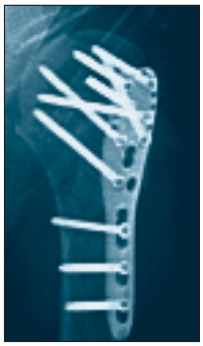
- Provide flexibility in screw placement, allowing for different constructs
- Permit multiple points of fixation to support the humeral head



A, C, D and E level screws for a "diverging" screw pattern



A, B, and D level screws for a "converging" screw pattern



Clinical example using A, B, C, and E level screws

Surgical Technique

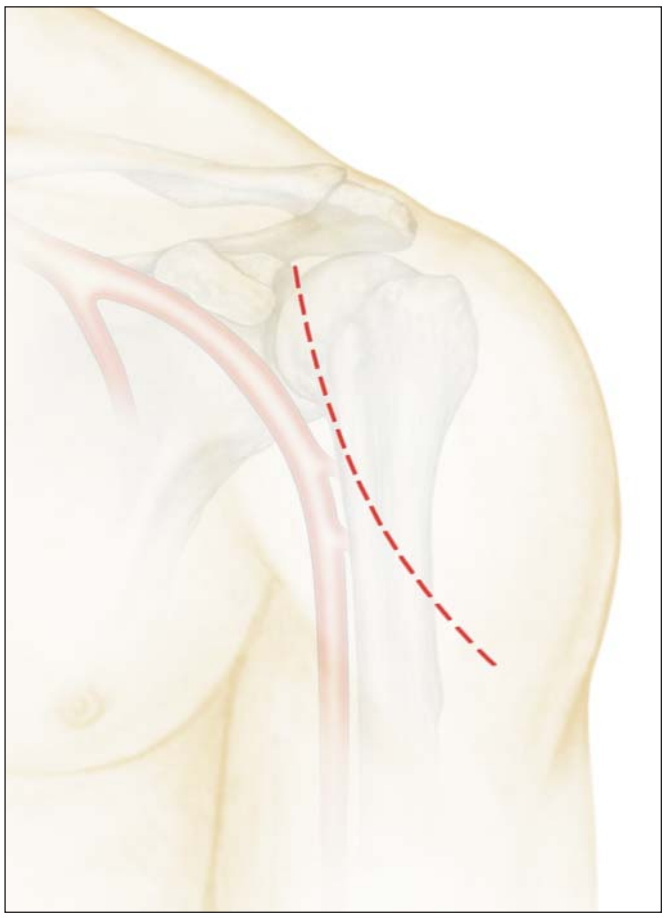
1 Patient position

A beach-chair position is recommended to provide easy access to the shoulder with imaging equipment.

2 Approach

A deltopectoral approach is suggested. Care should be taken to avoid damaging the vasculature of the fragments.

Note: *For information on open reduction approaches for proximal humerus, please refer to* T.P. Rüedi and W.M. Murphy: *AO Principles of Fracture Management*. Stuttgart, New York; Thieme, 2000, pp. 274-277.



A deltopectoral approach is suggested.

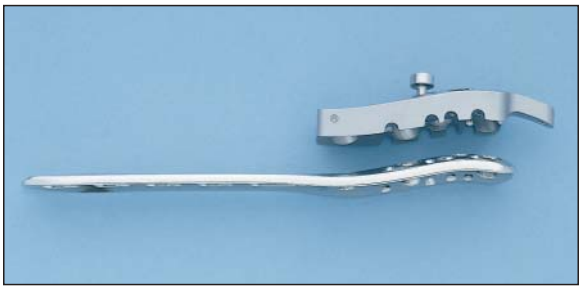
3 Reduce the fracture

Reduce the fracture fragments and confirm the reduction under image intensification.

The humeral head and tuberosity fragments may be manipulated and provisionally fixed with sutures and/or Kirschner wires. However, K-wires should be placed where they will not interfere with plate application.

Note: *The locking screws do not provide any compression for a lag screw effect. Therefore, humeral head fragments must be reduced, and any desired interfragmentary compression must be obtained prior to applying the 3.5 mm LCP Proximal Humerus Plate with locking screws.*

Insertion Guide: top view (left) and bottom view (right).



Attach the Insertion Guide [323.050] to the plate to insert the proximal locking screws.

4 Attach the insertion guide to the plate

To facilitate insertion of the proximal locking screws, place the Insertion Guide [323.050] against the plate and tighten the guide's attachment screw with the Small Hexagonal Screwdriver [314.02], to lock the guide against the plate.

Note: *The stability of the construct can be increased by the insertion of sutures. If sutures are to be used in conjunction with the plate, they should be passed through the plate prior to attaching the insertion guide.*

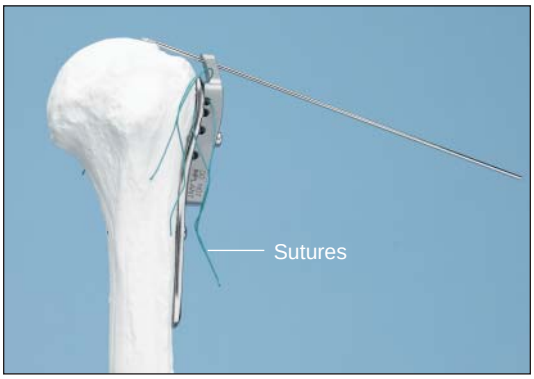
Lock the Insertion Guide to the plate by tightening the attachment screw with the Small Hexagonal Screwdriver [314.02].

Surgical Technique (continued)

5 Apply plate to bone

Positioning from AP view

The plate should be placed approximately 8 mm distal to the rotator cuff attachment on the upper edge of the greater tuberosity. Care should be taken to avoid placing the plate too high because this could increase the risk of subacromial impingement. However, care should also be taken to avoid placing the plate too low which could prevent optimal screw placement in the humeral head.



Determine plate position by placing a 1.6 mm K-wire through the proximal guide hole of the insertion guide so that the K-wire rests on top of the humeral head and aims at the proximal joint surface.

Positioning from a lateral view

The plate should be centered against the lateral aspect of the greater tuberosity, ensuring that a sufficient gap is maintained between the plate and the long biceps tendon (arterial blood supply).

To check the placement of the plate, 1.6 mm K-wires and two sleeve assemblies [323.053, 323.054, and 323.055] can be used: one in the hole for the most proximal screw to be placed and one in the hole for the most distal screw to be placed in the humeral head. If possible, the distal K-wire should be positioned approximately 5 mm above the calcar.

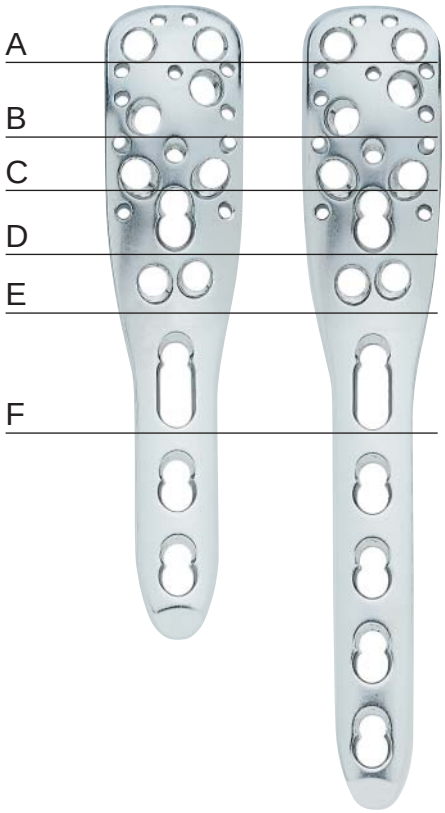
The plate should be centered against the lateral aspect of the greater tuberosity (sutures have been omitted for clarity).

Note: *To maintain proper alignment between the insertion guide and the plate, intraoperative bending of the plate is not recommended.*

Check placement of plate by inserting a K-wire and sleeve assembly as shown.

6 Insert screws

The placement of the initial screw will depend on the fracture type and the reduction achieved. There are two options for the order of screw insertion:



Option 1: Insertion of a proximal screw first

This technique permits fixation of the proximal fragments first and then fixation with or without compression distally.

It is necessary to control the height of the plate in the AP view under image intensification before insertion of the screws.

Option 2: Insertion of a distal screw first

This technique permits reduction of the distal shaft fragment against the plate and a final height adjustment prior to the insertion of the other screws in the shaft.

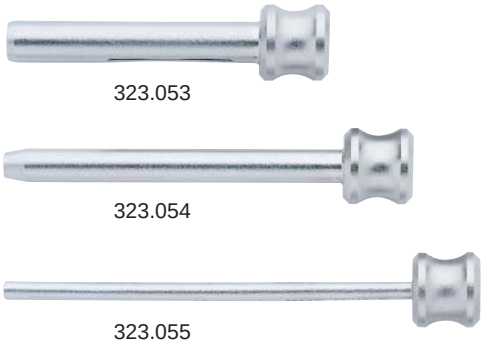
Insert a standard cortex screw into the compression portion of hole F (elongated hole); then insert proximal locking screws.

Surgical Technique (continued)

6 Insert screws (continued)

Proximal locking screw insertion

Insert the 3.5 mm Locking Screw Sleeve [323.053], the 2.8 mm Drill Sleeve [323.054], and the 1.6 mm Wire Sleeve [323.055] into the Insertion Guide [323.050].



Sleeve assembly

Insert a 1.6 mm K-Wire, 150 mm [292.71] through the sleeve assembly. Stop when increased resistance from the subchondral bone is felt. Since it may not always be possible to feel this resistance, the use of image intensification is recommended.

Note: *The K-wire tip should come as close as possible to the subchondral bone, approximately 5–8 mm from the joint surface.*

Slide the Direct Measuring Device [323.025] over the K-wire and push it against the sleeve assembly.

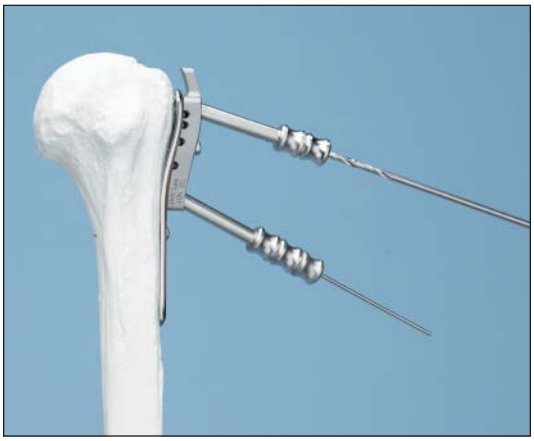
Measure screw length by sliding the Direct Measuring Device [323.025] over the K-wire.

Note: *All three sleeves must be present. The Direct Measuring Device provides an approximate screw length.*

Important: *When selecting the appropriate screw length, the possibility of bone resorption at the fracture site must be taken into account. Care should be taken to ensure that the screw tip is a sufficient distance from the joint surface. Check that the plate supports the lateral aspect of the greater tuberosity.*

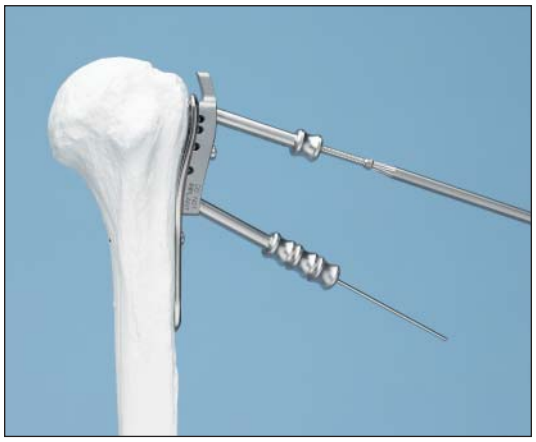
Remove the K-wire and the K-wire centering sleeve.

Drill the near cortex with the 2.8 mm Drill Bit [310.288] through the Drill Sleeve. Remove the Drill Sleeve.



Drill the near cortex with the 2.8 mm Drill Bit [310.288] through the drill sleeve.

Insert the appropriate length locking screw through the 3.5 mm Locking Screw Sleeve.



Use the StarDrive Screwdriver, T15, [314.115] to insert the locking screw through the 3.5 mm Locking Screw Sleeve [323.053].

Note: *The Depth Gauge for 2.7 mm and small screws [319.01] may also be used to determine screw length. This depth gauge will give an approximate measurement for the proximal screws when used through the Insertion Guide and will give an approximate measurement for the distal screws when placed against the plate. To ensure that the screw tip is a sufficient distance from the joint surface, 10 mm should be deducted from depth gauge readings for the proximal screw.*

Alternatively, screw length can be measured using the Depth Gauge for 2.7 mm and small screws [319.01].

Surgical Technique (continued)

6 Insert screws (continued)

Distal locking screw insertion

For proper drilling of the shaft holes, the 2.8 mm Threaded Drill Guide [312.648] must be used.

Thread the Drill Guide into the threaded part of the shaft holes.

Drill with the 2.8 mm Drill Bit and remove the Drill Guide.

Measure screw length with the Depth Gauge [319.01].

Note: *For more stable fixation, insertion of the locking screw through both cortices is recommended.*

Use the 2.8 Threaded Drill Guide when drilling holes for the 3.5 mm locking screws in the shaft holes of the plate.

Distal standard screw insertion

For nonlocking screws, use the standard AO screw insertion technique.

7 Remove Insertion Guide

8 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.

Final construct

Product Information

3.5 mm LCP® Proximal Humerus Plates

Must be used with a Synthes Small Fragment LCP® Instrument and Implant Set [105.434] or [145.434].

241.901

241.903

Implants

241.901 3.5 mm LCP® Proximal Humerus Plate–standard, 3 hole shaft, 90 mm
241.903 3.5 mm LCP® Proximal Humerus Plate–standard, 5 hole shaft, 114 mm

441.901 3.5 mm Titanium LCP® Proximal Humerus Plate–standard, 3 hole shaft, 90 mm
441.903 3.5 mm Titanium LCP® Proximal Humerus Plate–standard, 5 hole shaft, 114 mm

Instruments

323.050 Insertion Guide
323.053 3.5 mm Locking Screw Sleeve
323.054 2.8 mm Drill Sleeve
323.055 1.6 mm Wire Sleeve

323.050

323.053

323.054

323.055

Required Set

105.434 Small Fragment LCP® Instrument and Implant Set
or
145.434 Small Fragment LCP® Instrument and Titanium Implant Set

SYNTHES (USA)

1690 Russell Road
Paoli, PA 19301-1262
Telephone: (610) 647-9700

Fax: (610) 251-9056
To order: (800) 523-0322

SYNTHES (CANADA) LTD.

2566 Meadowpine Boulevard
Mississauga, Ontario L5N 6P9
Telephone: (905) 567-0440

Fax: (905) 567-3185
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