
Surgical Technique
Warning
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.depuy.synthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuy.synthes.com/hcp/reprocessing-care-maintenance
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The LCP Dia-Meta (Diaphyseal–Metaphyseal) Volar Distal Radius Plate is an anatomic plate designed for fractures of the distal radius that extend into the radial shaft.

The plate design combines 2.4 mm locking technology in the distal radius with 3.5 mm LCP technology in the radial shaft. Dia-Meta plates are left and right specific and are offered in six different lengths to address a wide variety of fractures.
Features and Benefits

- Precontoured plate offers an anatomic fit in the distal radius and radial shaft
- All plates are straight up to 5 holes. Beyond the fifth hole the shaft is precontoured to match the radial bow
- 4-hole head configuration is similar to the 2.4 mm LCP extra-articular volar distal radius plate
- Distal locking screws offer a fixed angle construct to support the articular surface

- Smooth surface finishing and rounded edges minimize tendon irritation and adhesion
- Available left or right, with 5, 7, 9, 11, 13, or 15 hole shaft lengths*
- Available in stainless steel or pure titanium*

*all plates available in sterile only

Plate head
- 25° angulation in head of plate fits volar distal radius
- Screw angles are identical to the angles in the 4-hole head 2.4 mm LCP extra-articular volar distal radius plate

- 2.4 mm locking holes in head of plate
- 3.5 mm combi-holes in plate shaft can accept 3.5 mm cortex, 3.5 mm locking, or 4.0 mm cancellous screws
- Relief notches at alternating holes after the 7th hole, to facilitate additional contouring
- Combi-holes can provide angular stability with locking screws or compression with cortex screws

* all plates available in sterile only
Synthes Biomaterials Overview

Synthetic and allogenic bone replacement materials have the advantage of uniform quality, unlimited availability and absence of potential complications at a donor site.

Additionally, the application of synthetic and allogenic bone graft substitutes reduces the duration of the surgery.

Synthes offers a wide range of synthetic biomaterial products in different application forms and with distinct biological properties:

**chronOS**
- Osteoconductive, resorbable, synthetic

**chronOS Perfusion Concept**
- Enhancing chronOS with biological factors

**chronOS Inject**
- Injectable remodelling

**Norian SRS**
- Injectable stability

**DBX***
- Osteoinductive power

Furthermore a comprehensive portfolio of allograft products is available in selected countries.

For more detailed information about a specific product or availability of allografts please contact your local Synthes representative.

*Facilitated through Synthes
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation. Those principles, as applied to the LCP Dia-Meta Volar Distal Radius Plate, are:

**Anatomic reduction**
The anatomic plate facilitates restoration of the articular surface with locking screws. Multiple plate lengths facilitate restoration of the radial bow.

**Stable fixation**
Locking screws create a fixed-angle construct, providing angular stability.

**Preservation of blood supply**
Limited contact plate design reduces plate-to-bone contact. Additionally, locked plates do not need close contact with the bone, which helps limit vascular trauma.

**Early, active mobilization**
Early mobilization per standard AO technique creates an environment for bone healing, expediting a return to optimal function.

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Indications

LCP Dia-Meta Volar Distal Radius Plates are indicated for fractures, osteotomies, and nonunions of the radius.
**Clinical Cases**

**Case 1**
- 61-year-old female, distal radius fracture
- Used a 7-hole shaft dia-meta plate

**Case 2**
- 19-year-old male, gunshot wound
- Good bone quality
- Used a 9-hole shaft dia-meta plate
Case 3
- 81-year-old female, cycling accident
- Used a 7-hole shaft dia-meta plate with DBX
Contour Plate (Optional)

1

Instruments

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>329.040</td>
<td>Bending Iron for Plates 2.4 to 3.5, length 145 mm</td>
</tr>
<tr>
<td>and</td>
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</tr>
<tr>
<td>329.050</td>
<td>Bending Iron for Plates 2.4 to 3.5, length 145 mm</td>
</tr>
<tr>
<td>329.150*</td>
<td>Bending Pliers for Plates 2.4 to 4.0, length 230 mm</td>
</tr>
</tbody>
</table>

If necessary, carefully contour the plate to fit the patient's radial anatomy using the bending irons or bending pliers. Be careful to avoid overbending of the plate which could cause damage to the plate threads.

* Also available
Position Patient and Approach

2
Position patient

Place the patient in the supine position with the hand and arm on a hand table, preferably radiolucent for fluoroscopic imaging. The elbow should be fully extended and in full supination.¹

3
Approach

Make a longitudinal incision slightly radial to the flexor carpi radialis tendon (FCR). Dissect between the FCR and the radial artery, exposing the pronator quadratus. Detach the pronator quadratus from the lateral border of the radius and elevate it toward the ulna. The incision can be extended proximally depending on the fracture pattern and length of plate used.

To get better exposure of the radius, it is helpful to pronate the forearm.²

Important: Leave the volar wrist capsule intact to avoid devascularization of the fracture fragments and destabilization of the volar wrist ligaments.

4
Reduce fracture and position plate

<table>
<thead>
<tr>
<th>Instruments</th>
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</tr>
</thead>
<tbody>
<tr>
<td>310.250 310.250</td>
<td>Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>323.360 Universal Drill Guide 3.5</td>
<td></td>
</tr>
<tr>
<td>319.010 Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm</td>
<td></td>
</tr>
<tr>
<td>314.020 Screwdriver, hexagonal, small, with Holding Sleeve</td>
<td></td>
</tr>
</tbody>
</table>

After reducing the fracture, apply the plate to fit the volar surface and insert a 3.5 mm cortex screw into the first appropriate elongated combi-hole.

Drill for a 3.5 mm cortex screw.

Insert a 3.5 mm cortex screw in the nonthreaded portion of an elongated combi-hole.

Adjust the plate as necessary and tighten the screw.

Note: The fracture pattern will dictate the appropriate site for this first screw.
## 5

**Insert proximal screws**

### Instruments

<table>
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</thead>
<tbody>
<tr>
<td>310.250</td>
<td>Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>310.288</td>
<td>Drill Bit Ø 2.8 mm, length 165 mm, for Quick Coupling</td>
</tr>
<tr>
<td>323.360</td>
<td>Universal Drill Guide 3.5</td>
</tr>
<tr>
<td>312.648</td>
<td>LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm</td>
</tr>
<tr>
<td>319.010</td>
<td>Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm</td>
</tr>
<tr>
<td>311.431</td>
<td>Handle with Quick Coupling</td>
</tr>
<tr>
<td>314.116</td>
<td>Screwdriver Shaft Stardrive 3.5, SD15, self-holding, for Quick Coupling</td>
</tr>
<tr>
<td>314.036</td>
<td>Screwdriver Shaft 2.5, hexagonal, self-holding</td>
</tr>
<tr>
<td>511.773</td>
<td>Torque Limiter, 1.5 Nm, for Quick Coupling</td>
</tr>
</tbody>
</table>

Determine where 3.5 mm locking or 3.5 mm cortex screws will be used in the shaft of the plate. Insert these screws as needed, according to the fracture pattern. If a combination of locking and cortex screws is planned, a cortex screw should be used first to pull the plate to the bone.

Drill for a 3.5 mm cortex screw using the 2.5 mm drill bit, with the 3.5 mm universal drill guide. Use the hexagonal screwdriver to insert the screw.

3.5 mm locking screws may be placed in the threaded portion of the combi-hole. Drill using the 2.8 mm drill bit with the 2.8 mm threaded drill guide. Use the 3.5 SD15 Stardrive screwdriver to insert the locking screws.

**Note:** Use the 1.5 Nm torque limiter to insert the 3.5 mm proximal locking screws.
6
Insert distal screws and confirm joint reconstruction

Instruments

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>310.509</td>
<td>Drill Bit Ø 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>323.029</td>
<td>LCP Drill Sleeve 2.4, with Scale up to 30 mm, for Drill Bits Ø 1.8 mm</td>
</tr>
<tr>
<td>311.430</td>
<td>Handle with Quick Coupling, length 110 mm</td>
</tr>
<tr>
<td>314.467</td>
<td>Screwdriver Shaft, Star drive, T8, self-holding</td>
</tr>
<tr>
<td>319.005</td>
<td>Depth Gauge for Screws Ø 2.0 and 2.4 mm, measuring range up to 40 mm</td>
</tr>
</tbody>
</table>

Insert 2.4 mm locking screws into the distal portion (head) of the plate. The order of screw insertion in the metaphysis may vary depending on the fracture pattern and reduction technique. Verify plate and distal screw location with the drill bit or K-wires before inserting multiple screws.

**Technique tip:** Use the 0.8 Nm torque limiter to insert the 2.4 mm distal locking screws.

Optional instruments

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>511.776</td>
<td>Torque Limiter, 0.8 Nm, with Quick Coupling</td>
</tr>
</tbody>
</table>
**Alternative instrument**

| 323.035* | LCP Drill Sleeve 2.4, short, for Drill Bits | Ø 1.8 mm, for LCP Distal Radius Plates |

The short 2.4 mm threaded drill guide can also be used in the distal locking holes. Use of the short, threaded drill guide allows drill guides to be inserted in all four distal locking holes simultaneously.

Drill for a 2.4 mm locking screw using the 1.8 mm drill bit, with a 2.4 mm threaded drill guide. Use the T8 Stardrive screwdriver to insert the screw.

Confirm proper joint reconstruction, screw placement and screw length using multiple C-arm views. To assure the most distal screws are not in the joint, use additional views such as 10° tilted PA, 20° inclined lateral, and 45° pronated oblique.

* Also available

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**Close incision**

Use the appropriate method for surgical closure of the incision.
Optional bone void filler insertion
Determine if there is a bone void that requires filling to maintain reduction and aid in bone healing. Use autogenous bone graft or a synthetic bone graft or allograft product (see page 4).

Implant removal
To remove locking screws, unlock all screws from the plate and then begin to remove the screws completely from the bone. This avoids rotation of the plate when removing the last locking screw.
Screws Used with the LCP Dia-Meta Volar Distal Radius Plates
(Stainless Steel and Titanium)

2.4 mm locking screws, Stardrive
- For use in distal (head) round locking holes only
- Threaded, conical head locks securely into the plate to provide angular stability
- Locked screws allow unicortical screw fixation and load transfer to the near cortex
- T8 Stardrive recess mates with self-retaining screwdriver
- Stardrive recess provides improved torque transmission
- Self-tapping
- Implant-quality 316L stainless steel or titanium alloy (Ti-6Al-7Nb)
- 6 mm–30 mm lengths (2 mm increments)

3.5 mm locking screws, Stardrive or hex
- For use in the locking portion of combi-holes in the plate shaft
- Threaded, conical head locks securely into the plate to provide angular stability
- Locked screws allow unicortical screw fixation and load transfer to the near cortex
- SD15 Stardrive or hex recess mates with self-retaining screwdriver and provides improved torque transmission
- Self-tapping
- Implant-quality 316L stainless steel or titanium alloy (Ti-6Al-7Nb)
- 10 mm–30 mm lengths (2 mm increments)

3.5 mm cortex screws, hex
- For use in nonlocking portion of combi-holes in the plate shaft
- Used to provide compression or neutral fixation
- Self-tapping
- Implant-quality 316L stainless steel or titanium alloy (Ti-6Al-7Nb)
- 10 mm–30 mm lengths (2 mm increments)

X = 2 for stainless steel
X = 4 for titanium
**Implants**

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### Left plates

**LCP Dia-Meta Volar Distal Radius Plates**

Plates are available in stainless steel or pure titanium. Sterile versions only.

- 5 holes shaft, left, approximate overall length: 95 mm (0x.110.105S)
- 7 holes shaft, left, approximate overall length: 125 mm (0x.110.107S)
- 9 holes shaft, left, approximate overall length: 154 mm (0x.110.109S)
- 11 holes shaft, left, approximate overall length: 184 mm (0x.111.111S)
- 13 holes shaft, left, approximate overall length: 212 mm (0x.110.113S)
- 15 holes shaft, left, approximate overall length: 240 mm (0x.110.115S)

*x = 2 for stainless steel
  x = 4 for CP titanium*
Right plates

5 holes shaft, right, approximate overall length: 95 mm (0x.110.005S)

7 holes shaft, right, approximate overall length: 125 mm (0x.110.007S)

9 holes shaft, right, approximate overall length: 154 mm (0x.110.009S)

11 holes shaft, right, approximate overall length: 184 mm (0x.110.011S)

13 holes shaft, right, approximate overall length: 212 mm (0x.110.013S)

15 holes shaft, right, approximate overall length: 240 mm (0x.110.015S)
# Required 3.5 mm LCP Small Fragment Instruments

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<td>Handle with Quick Coupling, length 110 mm</td>
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<td>Handle with Quick Coupling</td>
</tr>
<tr>
<td>312.648</td>
<td>LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm</td>
</tr>
<tr>
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<td>Screwdriver, hexagonal, small, with Holding Sleeve</td>
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<td>319.010</td>
<td>Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm</td>
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</tr>
</tbody>
</table>

**Note:** All of these instruments are available in any 3.5 mm LCP Small Fragment Set.
### Required 2.4 mm LCP Instruments

<table>
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<td>310.509</td>
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</table>
**Optional instruments**

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<td>511.776</td>
<td>Torque Limiter, 0.8 Nm, with Quick Coupling</td>
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<tr>
<td>329.150</td>
<td>Bending Pliers for Plates 2.4 to 4.0, length 230 mm</td>
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**Note:** All of these instruments are available in the 2.4 mm LCP Distal Radius Set.
Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 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 thermo regulation 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.