Distal Radius Plate
Surgical Technique
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### Warning

This description is not sufficient for an immediate application of the instrument and implant set. An instruction by an experienced surgeon in handling this instrumentation is highly recommended.
Distal Radius Plate – Surgical Technique

**Dorsal Distal Radius Plates**

**Indications**
- Complex intra-articular and extra-articular fractures of the distal radius
- Osteotomies including carpal fusions of the distal radius

**Titanium alloy**
- Optimal combination of tensile strength and flexibility allows plate contouring.
- Excellent bending properties minimize fatigue fractures.
- Biocompatible material.
- Use with pure titanium cortex screws and pure titanium buttress pins.

**Features**
- Precontoured for anatomical fit
- Anatomical design minimizes the need to remove Lister's tubercle
- Low plate and screw profile minimize tendon and soft tissue irritation
- Cut-to-length design to minimize inventory
- Elongated holes in the proximal shaft allow compression
- Two proximal legs allow independent planes of fixation
- Dorsal plate available in right and left designs

**Unique distal articular plate arms**
- Accept threaded 1.8mm Buttress Pins that lock into the threaded plate holes, providing a fixed-angle construct of the articular surface.
- Self-tapping 2.4mm Cortex Screws can be used as an alternative to, or in conjunction with 1.8mm Buttress Pins for increased hold and to pull together dorsal and volar articular fragments.
- Provide multiple points of fixation and the ability to buttress small fragments, allowing the articular surface to be reconstructed more easily and to have enhancing support in heavily comminuted fractures.
**Implants**

### 1.8mm titanium buttress pins
- For use in the distal plate arms in multi-fragmented articular fractures, or in poor quality bone where screw hold would be compromised.
- Threaded head locks into threaded plate hole to provide a fixed pin/plate construct and a buttress for the articular surface.
- Smooth shaft inserts easily into bone without displacing fragments.

### Self-tapping 2.4mm titanium cortex screws
- For use in the distal plate arm to provide fixation for restoration of the articular surface.
- Used in good bone quality when lag screw technique is required, or in large fragments of bone poor quality.
- Small cruciform head provides a low profile when seated into the plate hole.

### Self-tapping 2.7mm titanium cortex screws
- For use in the DCU (Dynamic Compression Unit) holes of the proximal plate legs.
- Self-tapping thread eliminates the need to tap.
- Small screw head provides a low profile.
Dorsal approach

Place the patient in supine position with the hand and arm on a hand table, preferably radiolucent for fluoroscopic imaging. Distraction with an external fixator is useful in high-energy impaction fractures.

Make a straight longitudinal incision over the dorsal radius extending 5 to 10cm between the second and third dorsal extensor compartments. Open the extensor retinaculum performing a longitudinal incision between the first and second extensor compartments as shown below.
**Dorsal approach**

Take care to elevate and mobilize the third compartment (extensor pollicis longus) proximally and distally, and translocate it radially for better access to the fracture site.

Elevate the second and fourth dorsal compartments *subperiosteally* (as shown in the cross-sectional view) to preserve their integrity.
Dorsal approach

394.080 Mini Lengthening Apparatus, long

Note: if the fracture morphology dictates lengthening, the long Mini Lengthening Apparatus (394.080) with one pin placed either in the distal metaphyseal fragment or in the radius proximal to the fracture site, will provide gentle indirect reduction of complex fractures and minimizes soft tissue dissection.

Permanent reduction

Finger traps and approximately 3 kg weight help to obtain intra-operative reduction and fixation of the fracture.
Dorsal plate technique

1. Shape bending template

Temporarily position the bending template over the distal radius. Verify plate length and contour (Figure 1). After contouring the bending template, remove it carefully from the fracture site and compare it to the precontoured distal radius plate.

Note: the bending template can be used for either right or left-hand plates.

Technique tip: If a more proximal plate placement is desired, removal of 1-2mm of the distal portion of Lister’s tubercle may be necessary.

Note: In many distal intra-articular radius fractures, the surgeons can remove 1-2 holes from each plate limb.
Dorsal plate technique

2. Cut plate

Place the pliers in the right hand. To cut the plate, open the pliers and slide the plate into the cutting slot from the left side as shown. The underside of the plate must be oriented towards the pliers tip when the plate is inserted into the cutting slot. Cut the plate between the holes by aligning the plate in the center of the cutting slot. Do not cut through a plate hole. Close the pliers to cut the plate.

With pliers open, insert plate into left side of cutting slot.

Bending-Cutting Pliers 391.962

Figure 2
Technique tip: most cases will require removing one or two holes from each arm and leg of the plate in order to fit patient anatomy and provide sufficient stability without increasing tissue dissection.

Correct plate position: underside of plate towards pliers tip. Cut between plate holes where handles interface.

Incorrect plate position: top of plate towards pliers tip.
3. Contour distal plate arms

If required, use bending irons to contour the plate’s articular arms to fit the distal radius. Thread a bending iron into a distal-arm plate hole. Thread another bending iron into the adjacent hole and gently spread the irons apart to create a convex bend (Figure 3).

Note: contour the plate in small increments to avoid over-bending and the need to re-bend. Excessive back-and-forth bending may weaken or fracture the plate.

4. Contour proximal plate legs

If needed, use the bending pliers to gently contour the proximal legs to better fit the distal shaft of the radius (Figure 4).
5. Apply plate

Place the plate on the distal radius and determine which holes will be used for fixation. The specific order of fixation (proximal leg or distal arm) depends on the fracture pattern and clinical situation (Figure 5).

6. Secure distal arms

Determine whether 1.8mm titanium buttress pins or self-tapping 2.4mm titanium cortex screws will be used for fragment fixation. A combination of both implants may be used.

6A: to secure the plate with 1.8mm titanium buttress pins, thread a threaded drill guide 1.8 into the threaded plate hole until seated (Figure 6).

Note: the threaded drill guide must be used to ensure the proper drilling angle. Otherwise, the buttress pins may not thread into the plate holes.
Secure distal arms (continued)

Using the 1.8mm drill bit and drill guide, drill through both cortices (Figure 7). Buttress pins should be used bicortically. Avoid excessive protrusion through the far cortex.

Remove the drill guide and use the depth gauge to measure*, and select the appropriate length buttress pin. Using the cruciform screwdriver, push the buttress pin through the hole and turn until the threaded portion of the pin head locks into the plate (Figure 8).

**Technique tip:** consider the width of any gap between the bone and plate when determining pin length. Tightening the screws will close this gap and result in pin tip protrusion beyond the far cortex, potentially causing soft tissue irritation.

* If the depth gauge indicates a measurement between two marks, use the shorter length.
Secure distal arms (continued)

6B: to secure the plate with self-tapping 2.4mm titanium cortex screws, insert the 1.8mm end of the drill guide 2.4/1.8 into the plate hole (Figure 9). Use the 1.8mm drill bit and drill guide to drill through both cortices. Measure for appropriate screw length with the depth gauge.

Note: correct measurement of proximal and distal screw lengths requires different depth gauges.

Select and insert the appropriate self-tapping 2.4mm cortex screw with the cruciform screwdriver (Figure 10).

**Technique tip:** as with the buttress pins, be sure to consider the width of any gap between the bone and plate when determining screw length. Tightening of screws will close this gap and result in screw tip protrusion beyond the far cortex, potentially causing soft tissue irritation.

**Note:** caution should be used in determining the placement and angulation of the screws so that they do not interfere with each other or disrupt the articular surface.

2.4mm drill bits are available if the AO lag screw technique is desired.
7. Secure proximal legs

To secure the proximal arms of the plate with self-tapping 2.7mm titanium cortex screws, place the universal drill guide 2.7 in the plate hole (Figure 11).

For the neutral position, press the spring-loaded sleeve fully down into the plate hole (Figure 11A).

For the load or buttress position, place the drill guide at either end of the plate hole without applying downward pressure on the spring-loaded tip (Figure 11B).

Neutral position 11A: fully press the spring-loaded sleeve down into the plate hole.

Load position 11B: place the drill guide at either end of the plate hole without applying downward pressure on the spring-loaded tip.
7. Secure proximal legs (continued)

Drill through both cortices with a 2.0mm drill bit. Use the depth gauge to measure for screw length.

Insert the appropriate length self-tapping 2.7mm cortex screw using the small hexagonal screwdriver (Figure 12).

Repeat the procedure for each additional screw (Figure 13).

Note: 2.7mm drill bits are available if the AO lag screw technique is desired.
8. Dorsal closure

To protect soft tissues, leave compartments 2 and 3 (the extensor pollicis longus, extensor carpi radialis brevis and extensor carpi radialis longus) above the extensor retinaculum at the time of wound closure (see below).
9. Postoperative management

Based on the nature of the fracture and the stability achieved, the surgeon determines the postoperative management and rehabilitation of the patient individually. As a general rule, active assisted range of motion of the digits and forearm is initiated on the first postoperative day. Active assisted range of motion of the wrist can be initiated at the surgeon’s discretion. Remove sutures at 14–21 days postoperatively. Removal of the plate after 4-6 months is recommended.
Volar Distal Radius Plate

**Indications**
- Complex intra- and extra-articular fractures of the distal radius
- Osteotomies including carpal fusions of the distal radius

**Features and benefits**

**Precontoured for anatomical fit:**
- 20° AP bend fits the volar surface of the distal radius
- 18° angulation of distal plate arm provides anatomic fit for radial inclination
- 10° angulation of threaded holes allows more distal placement of the plate
- Right- and left-hand designs provide optimum fit

**Internally threaded holes in the distal arm**
- Accept threaded 1.8mm titanium buttress pins to provide a fixed-angle construct of the articular surface
- Also accept self-tapping 2.4mm titanium cortex screws as an alternative to, or in conjunction with buttress pins

**Elongated holes in the proximal shaft**
- Accept self-tapping 2.7mm titanium cortex screws
- Allow longitudinal adjustment of the plate prior to initial tightening of the screws
- Allow compression across the fracture site

**Low plate and screw-head profile**

Cut-to-length design reduces inventory to one size
Volar approach

Place the patient in supine position with the hand and arm on a hand table, preferably radiolucent for fluoroscopic imaging.

Make a longitudinal incision along the radial border of the distal forearm. The fracture can then be accessed between the flexor carpi radialis and the radial artery. The fracture is exposed through a radial incision of the pronator quadratus muscle. Its fibers are detached from the surface of the bone and retracted to the ulnar side. It is imperative not to open the volar wrist capsule to avoid devascularization of the fracture fragments and destabilization of the volar wrist ligaments. When direct visualization is required, it is accomplished by a dorsal arthrotomy or arthroscopy.

Volar plate technique

Follow dorsal surgical technique outlined in steps 1-7. Use appropriate method for surgical closure of the incision.
Titanium Distal Radius Plate Instrument and Implant Set (145.500)
St. Steel Distal Radius Plate Instrument and Implant Set (105.500)

Graphic Case

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Instruments

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<td>310.260</td>
<td>2.7mm Drill Bit, 100mm/75mm,* quick coupling, 2 units</td>
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<td>310.510</td>
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<td>310.530</td>
<td>2.4mm Drill Bit, 100mm/75mm,* quick coupling, 2 units</td>
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<td>311.010</td>
<td>Handle with mini quick coupling</td>
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<td>312.181</td>
<td>Drill Guide 2.4/1.8 for Distal Radius Plates</td>
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<td>312.920</td>
<td>Threaded Drill Guide 1.8 for Buttress Pins, 4 units</td>
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<td>314.020</td>
<td>Hexagonal Screwdriver, small, with Holding Sleeve</td>
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<td>314.670</td>
<td>Cruciform Screwdriver Shaft with Holding Sleeve</td>
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<td>319.060</td>
<td>Depth Gauge for 1.5mm and 2.0mm Screws</td>
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*Total length/effective length
Distal Radius Plate – Surgical Technique

**Titanium Distal Radius Plate Instrument and Implant Set (145.500)**

**St. Steel Distal Radius Plate Instrument and Implant Set (105.500)**

323.260 Universal Drill Guide 2.7
329.090 Bending Iron for Distal Radius Plates, 4 units
329.600 Bending Template, 2 units
391.962 Bending-Cutting Pliers
391.963 Universal Bending Pliers, 2 units

**Implants**

<table>
<thead>
<tr>
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<td>292.160</td>
<td>492.160</td>
<td>Kirschner Wire, 1.60mm dia., pack of 10</td>
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*in 2mm increments

**Additional available**

394.080 Mini Lengthening Apparatus