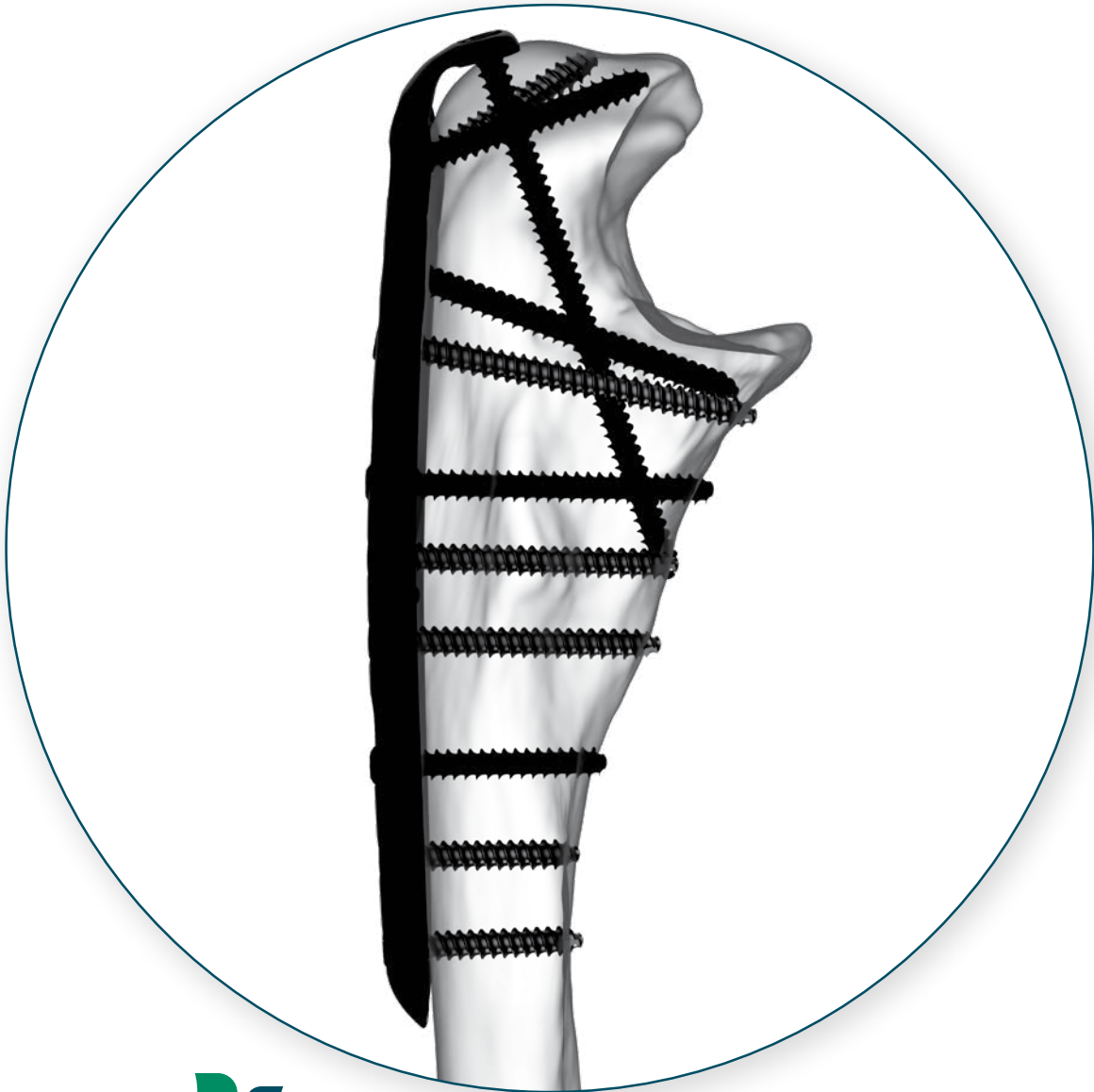


SURGICAL TECHNIQUE GUIDE

PROXIMAL ULNA PLATE



 **skeletal dynamics**[®]
UNDERSTANDING THE UPPER EXTREMITY

As described by:
Jorge L. Orbay, M.D.
Miami Hand & Upper Extremity Institute

PROXIMAL ULNA PLATE

Description

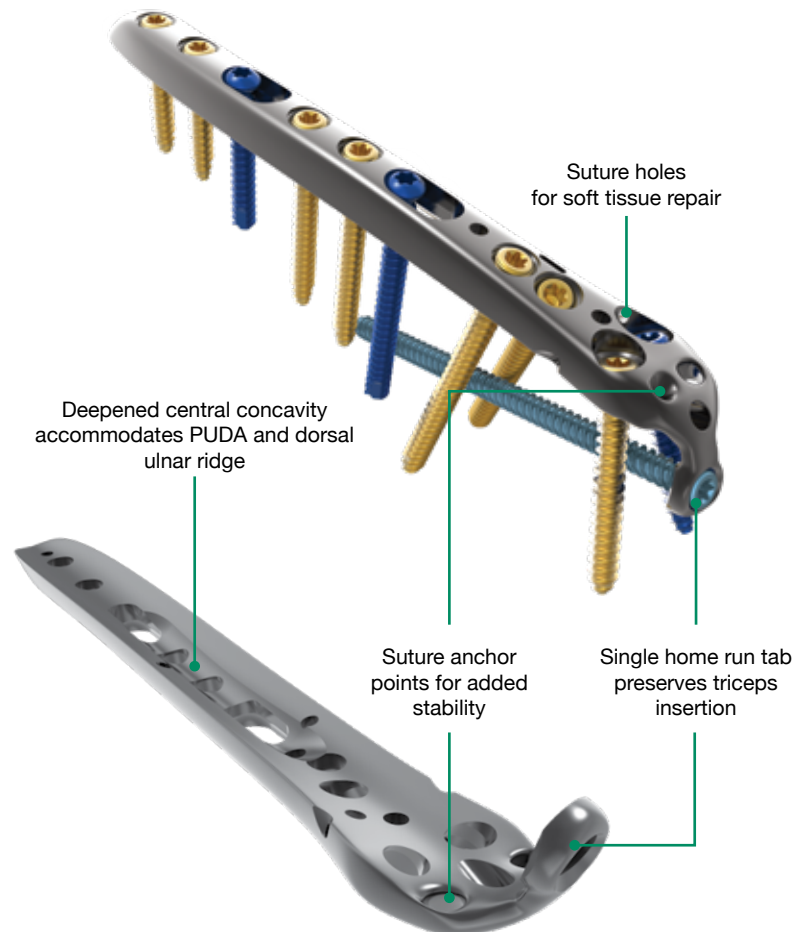
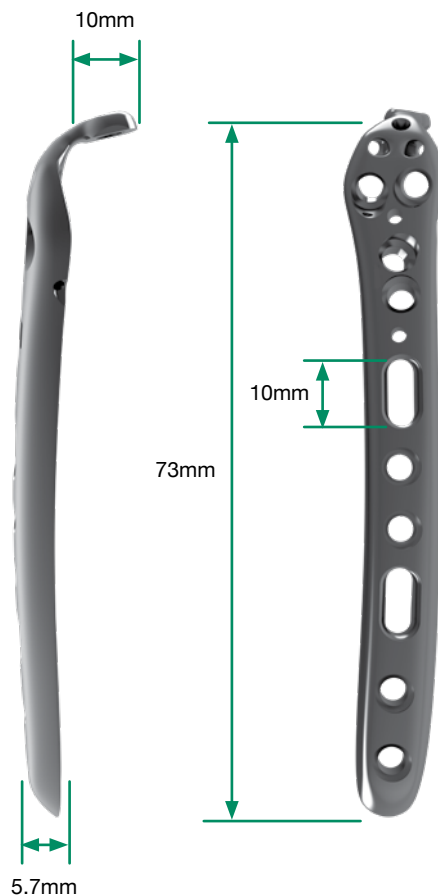
The Skeletal Dynamics Distal Elbow Plating System consists of titanium alloy plates and screws, cobalt chrome cannulated polyaxial locking screws, k-wires, and specialized instrumentation.

Proximal Ulna Implants include:

- 73mm plate (left and right specific)
- 108mm plate (left and right specific)
- 151mm plate (left and right specific)
- 3.5mm titanium locking screws
- 3.5mm multi-thread compression screws
- 3.5mm cortical non-locking screws
- 3.0mm cobalt chrome polyaxial locking screws

Indications for Use

The Skeletal Dynamics Distal Elbow Plating System is intended for fixation of fractures, fusions, osteotomies and non-unions of the radius and ulna, particularly in osteopenic bone.



1

SUPERFICIAL EXPOSURE



With the elbow flexed 90°, make a posterior incision extending distally, curving around the olecranon and over the subcutaneous border of the ulna.

Note:

The incision can be curved slightly lateral or medial to the tip of the olecranon based on your preferred method.

Warning:

Take care to avoid injury to the ulnar nerve.

2

RELEASING THE ULNAR NERVE



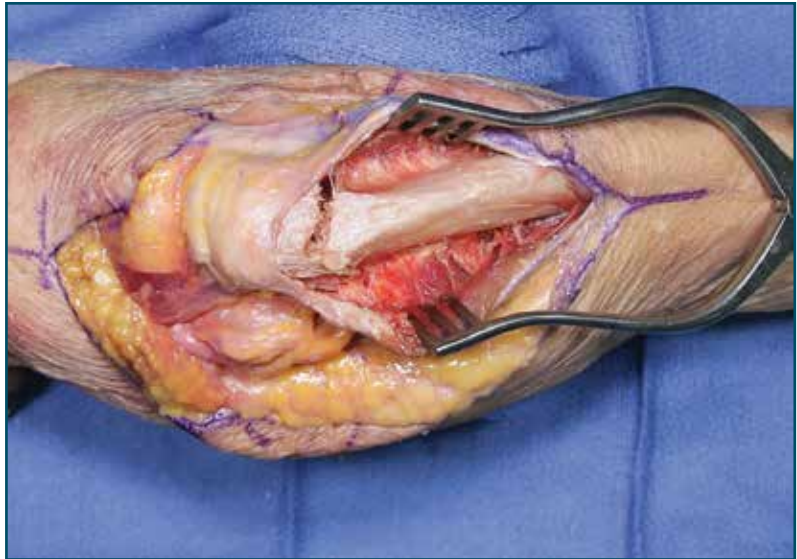
Locate the ulnar nerve.

Release and protect the nerve, considering the possibility of transposition.

DEEP EXPOSURE

3

Expose the proximal ulna subperiosteally.



ACCESSING THE JOINT

4

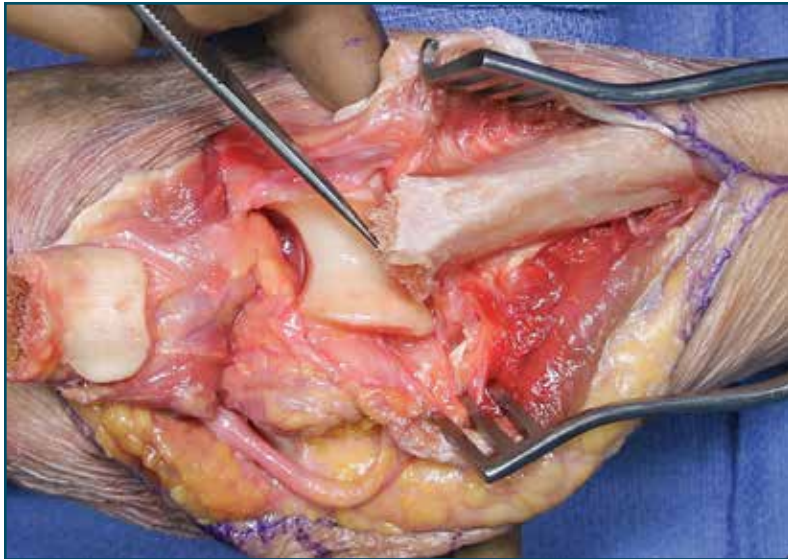
For olecranon fractures, enter the joint through the fracture plane by releasing the capsular attachments on the proximal fragment as needed.

The articular surfaces can be evaluated at this time.



5

DEBRIDING THE FRACTURE



Debride the fracture site.

Note:

It is necessary to remove callus, clot and fibrous tissue in order to achieve a proper reduction.

6

DISTAL TRICEPS RELEASE



Starting distal to proximal, split the triceps insertion longitudinally for approximately 1cm.

Elevate the triceps along a narrow longitudinal strip to provide space for the "Home Run" (HR) tab.

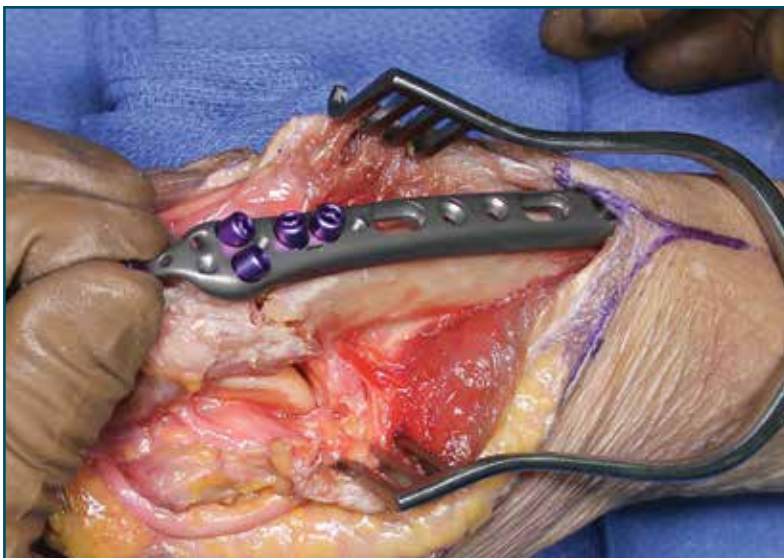
Select the appropriate length of plate that provides at least six cortices of fixation distal to the fracture line.

Note:

The shaft of the 151mm length plate can be bent using the Bending Irons. If plate bending is necessary, refer to step 36.

Warning:

Bending may weaken or break the plate. Be sure to inspect the plate for damage prior to use.



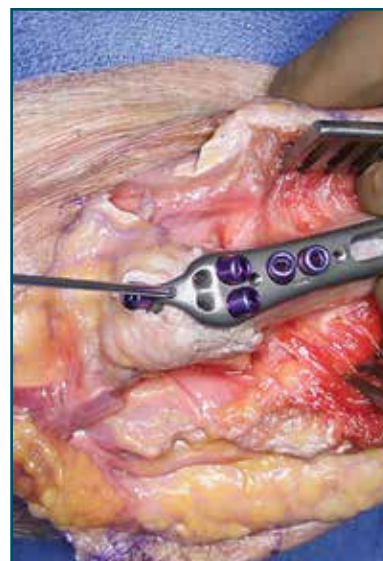
PROVISIONAL PLATE FIXATION

8

Apply the plate to the proximal fragment confirming that the plate is centered on the ulna shaft and that the HR tab is flush to the olecranon.

Secure the plate to the proximal fragment using a 2mm k-wire through the hole at the base of the HR tab.

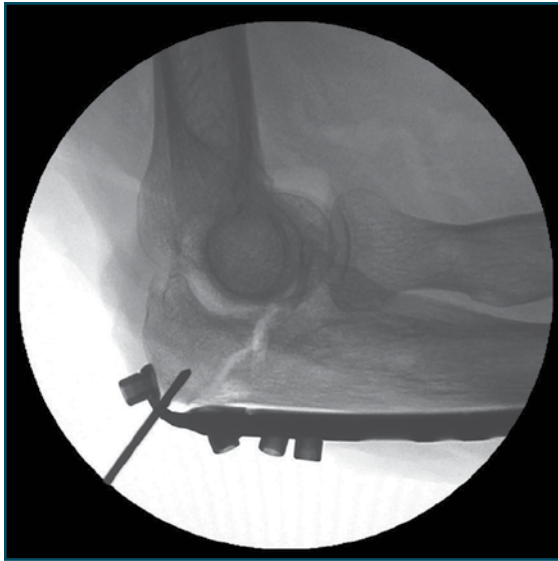
Note: If the home run tab adjustment is necessary to improve fit, refer to step 37.



KWIR-STD-20152: K-Wire, Standard Tip, 2.0 mm x 152 mm

9

FRACTURE REDUCTION

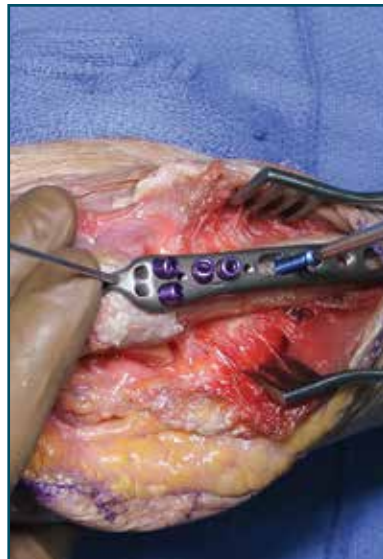
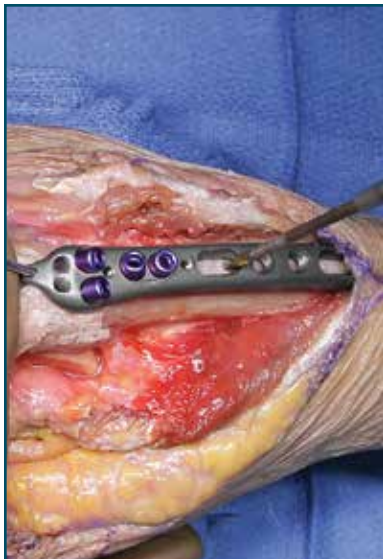


Reduce the fracture by levering the shaft of the plate to the distal fragment.

Confirm fracture reduction and plate alignment using fluoroscopy.

10

DISTAL FRAGMENT FIXATION



Using the 2.7mm x 40mm drill bit, drill through the distal end of an oblong hole that is distal to the fracture line through both cortices. This will allow for dynamic compression of the fracture.

Measure screw length using the appropriate scale on the 50mm Depth Gauge, then insert a 3.5mm compression screw using the T-10 driver while applying interfragmentary compression.

Note:

The depth gauge has a dual scale to reflect measurements through the PDGs (top scale) or directly through the plate (bottom scale).



DRLL-SSC-27040: Drill, 2.7mm x 40mm



DPGA-UNV-050: Depth Gauge, Universal, 50mm



DRVR-UQC-T10: Driver, Universal Quick Connect, T10



PANL-35XXX-TS: Screw, Cortical Non Locking, 3.5mm x XX8mm, Ti

PROXIMAL FIXATION OPTIONS

11

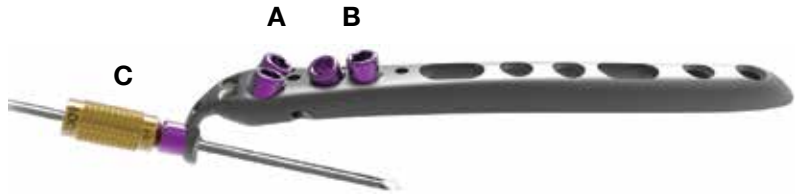
A. The two proximal holes containing pre assembled drill guides (PDGs) are for fixation to the olecranon.

B. The adjacent two distal holes containing PDGs are for fixation to the coronoid.

C. All PDGs can accept an AIMing Guide using 2.0mm k-wires for provisional fixation.

If it is necessary to alter a screw trajectory, remove the PDG and drill free-hand. A tissue protector is included in the system.

If a 3.0mm Cannulated Polyaxial Locking Screw (PLS) is needed, refer to steps 22 through 25.



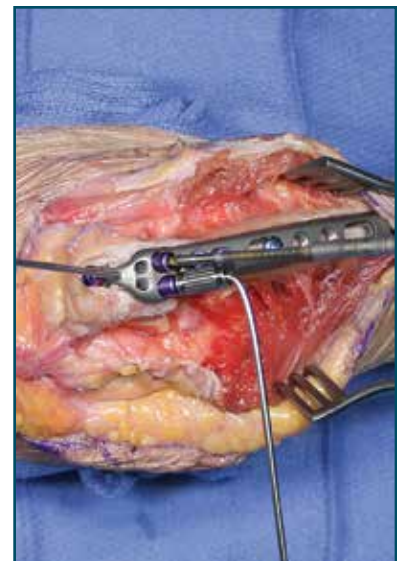
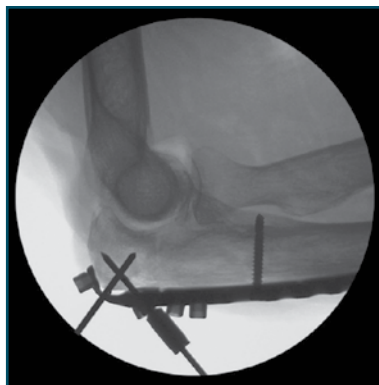
TPDG-DSD-XL: Tissue Protector / Drill Guide, Dual Sided, 2.7mm x 2.7mm, XL

PROVISIONAL K-WIRE FIXATION

12

If provisional plate fixation is needed, insert a 2.0mm AIMing Guide into the desired PDG, then drive a 2.0mm k-wire through the AIMing Guide, taking care to avoid the articular surfaces of the joint.

Using the 2.7mm drill bit, drill through the PDG. If a k-wire obstructs drilling, it may be bent out of the way.

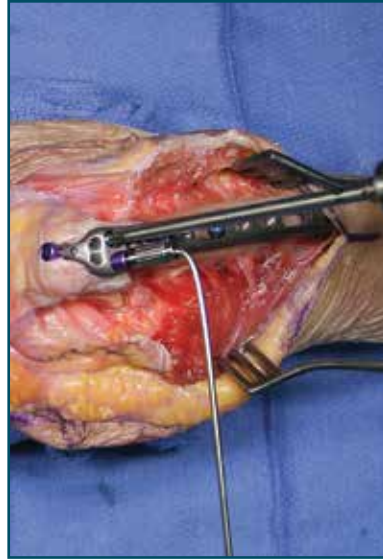
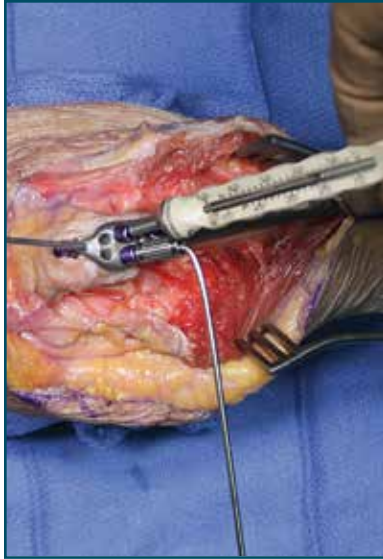


PDG-AIM-020: AIMing Guides, 2.0mm



KWIR-STD-20152: K-Wire, Standard Tip, 2.0 mm x 152 mm

13 OLECRANON FIXATION



Measure the screw length using the appropriate scale on the 50mm Depth Gauge.

Using the T-10 driver, remove the PDG and insert the correct length 3.5mm Multi-Thread Compression Screw until the screw head contacts the plate.

Remove the k-wire at the base of the HR tab, then fully seat the Compression Screw until the plate is reduced to the olecranon.

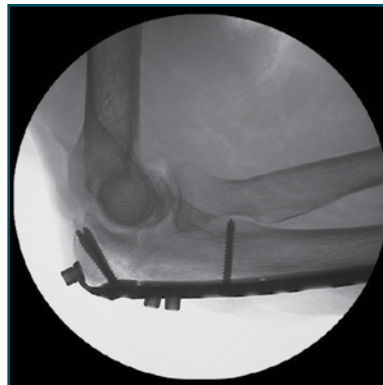
Note:

It is recommended to subtract ~2mm from the measured screw lengths to avoid compromising the articular surfaces and/or soft tissue irritation.



MTNL-35XXX-TS: Screw, Multi-Thread Compression, 3.5mm x XXmm, Ti

14 FLUOROSCOPIC CONFIRMATION



Repeat steps 12 and 13 for the remaining olecranon screw hole using a 3.5mm Multi-Thread Locking Screw.

Confirm proper plate positioning, fracture reduction and screw lengths using fluoroscopic imaging.



MTLS-35XXX-TS: Screw, Multi-Thread Locking, 3.5mm x XXmm, Ti

PREPARING THE HOME RUN TAB

15

Confirm that the HR tab is flush to the tip of the olecranon. If necessary, bend the tab as described in step 37.

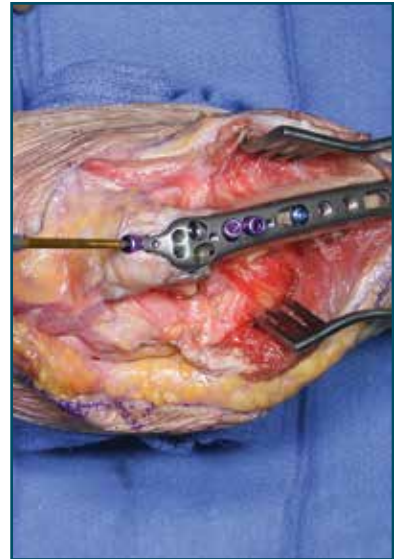
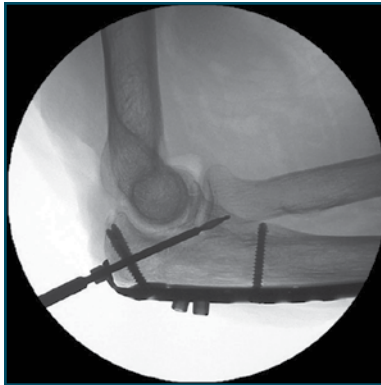
Using the 2.7mm x 80mm drill bit, drill through the PDG, then measure and record the screw length using the appropriate scale on the 80mm Depth Gauge.

Note:

If the HR tab was bent, confirm that the new trajectory will avoid contact with the articular surfaces of the joint.

Warning:

Bending may weaken or break the tab. Be sure to inspect the tab for damage prior to use.



DRLL-SSC-27080: Drill, 2.7mm x 80mm



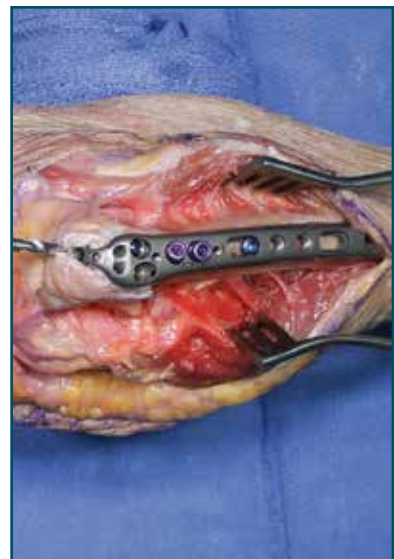
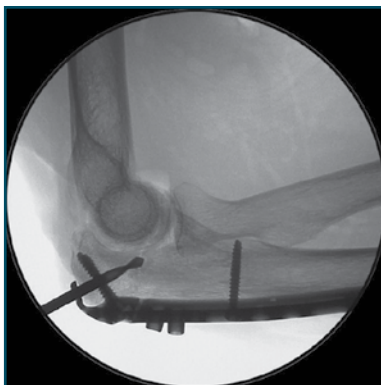
DPGA-UNV-080: Depth Gauge, Universal, 80mm

OVER DRILLING THE HOME RUN TAB

16

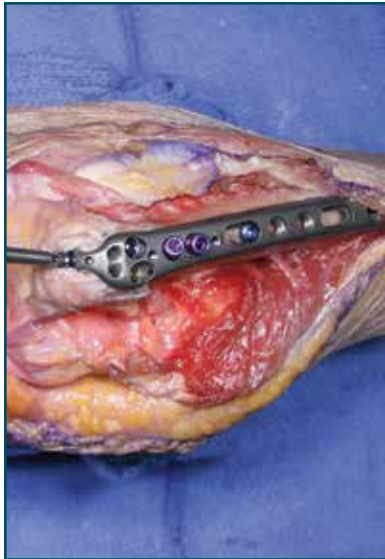
Using the T-10 driver, remove the PDG in the HR tab.

Drill up to the fracture line using the 3.5mm drill bit. Fluoroscopic imaging is helpful during this step.



DRLL-SSC-35070: Drill, 3.5mm x 70mm

17 LAGGING THE PROXIMAL FRAGMENT



Loosen the screw previously placed in the oblong hole of the shaft.

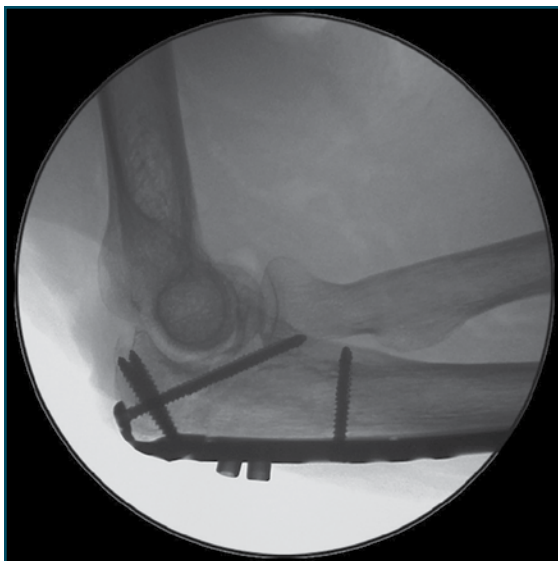
Insert the recorded length 3.5mm Multi-Threaded Compression Screw through the HR tab to further reduce the fracture.

Retighten the screw in the oblong hole of the shaft.



MTNL-35XXX-TS: Screw, Multi-Thread Compression, 3.5mm x XXmm, Ti

18 FLUOROSCOPIC CONFIRMATION



Confirm proper plate positioning, fracture reduction and screw lengths using fluoroscopic imaging.

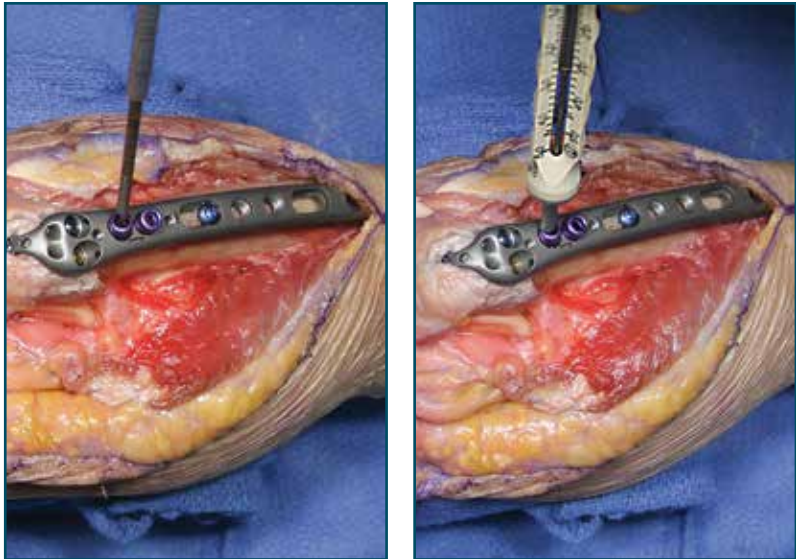
CORONOID PREPARATION 19

Using the 2.7mm drill bit, drill through each PDG.

Measure the screw length using the appropriate scale on the 50mm Depth Gauge.

Note:

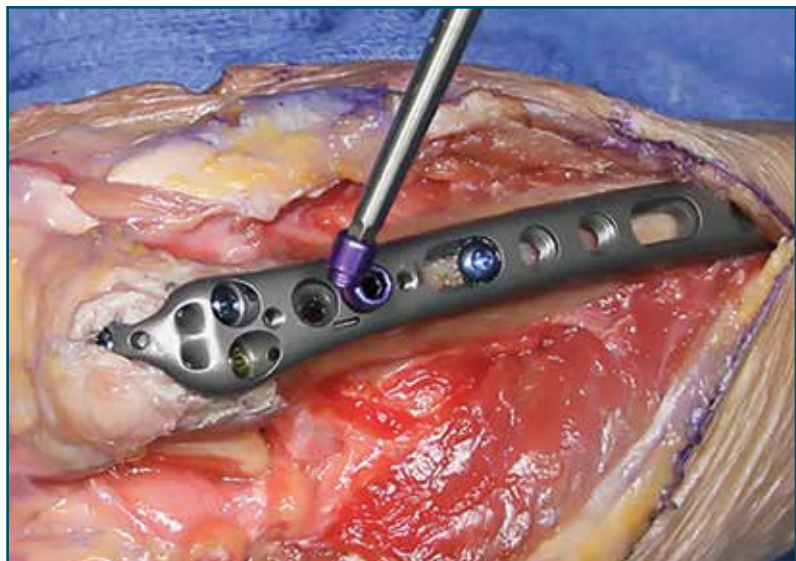
If the home run tab has been repositioned, consider the use of a Polyaxial Locking Screw if impingement occurs.



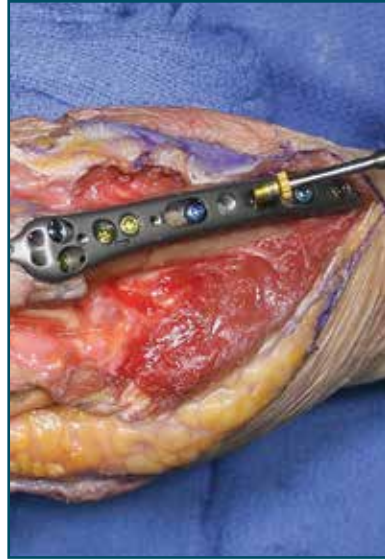
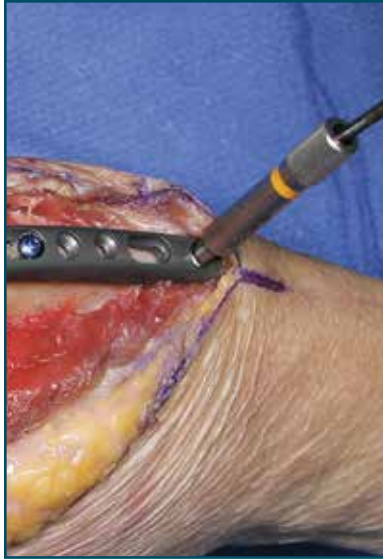
CORONOID FIXATION 20

Using the T-10 driver, remove the PDG and insert the correct length 3.5mm Multi-Thread screw until fully tightened.

Repeat steps 19 and 20 for the remaining coronoid screw hole.



21 DISTAL PLATE FIXATION



If fixed angled fixation through any of the threaded holes is desired, secure the appropriate Thread-In Drill Guide into the selected hole.

Using the 2.7mm drill bit, drill to the proper depth. Read the length directly from the drill or by removing the Thread-In Drill Guide and using the 50mm Depth Gauge.

Insert and fully tighten the desired screw using the T-10 driver. Repeat this step for the remaining distal threaded holes.

For oblong holes, drill free-hand, then measure and insert a compression screw until fully seated to the plate.

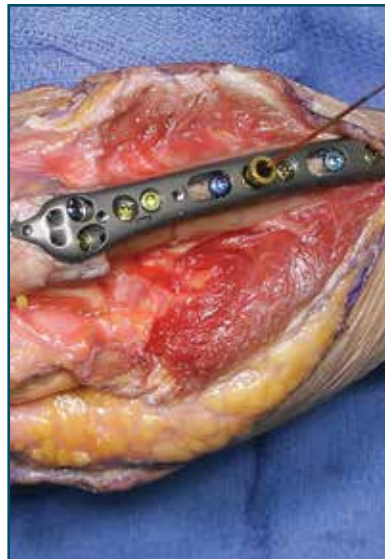
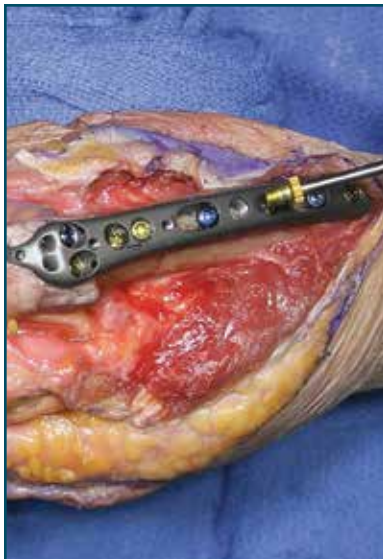


TPDG-27-M: Thread-in Drill Guide, 2.7mm x 40mm, Multi-Thread



TPDG-DSD-XL: Tissue Protector / Drill Guide, Dual Sided, 2.7mm x 2.7mm, XL

22 CANNULATED 3.0 PLS SETUP (OPTIONAL)



If a Polyaxial Locking Screw is needed in any of the threaded holes, use the T-10 driver to remove the PDG if present and insert the 1.1mm PLS AIMing Guide.

Insert a 1.1mm k-wire through the PLS AIMing Guide in the desired trajectory until the far cortex is reached.

Note:

Fluoroscopy is helpful to confirm the trajectory of the k-wire.



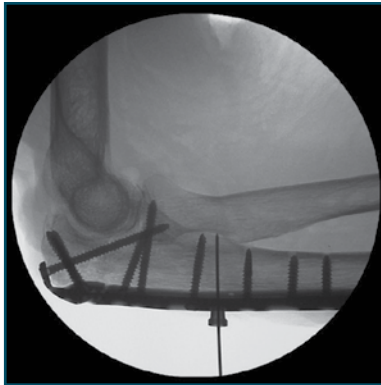
PDG-AIM-011: PLS AIMing Guide, 1.1mm x 10°



KWIR-PLS-11152: K-Wire, 1.1 mm x 152 mm

FLUOROSCOPIC CONFIRMATION 23

After confirming the k-wire reaches the far cortex, use the cannulated 3.0 PLS T-10 driver to remove the PLS AIMing Guide, leaving the k-wire in place.



DRVR-PLS-30C: Driver, 3.0 PLS, T-10

CANNULATED 3.0 PLS PREPARATION 24

Slide the cannulated Depth Gauge over the k-wire to measure the appropriate length of screw.

Using the 2.4mm cannulated PLS drill bit, drill over the k-wire to the proper depth.



DPGA-PLS-030: Cannulated Depth Gauge, Polyaxial Locking Screw, 3.0mm



DRLL-PLS-24: Drill, Cannulated, PLS, 2.4mm x 40mm

25 CANNULATED 3.0 PLS FIXATION



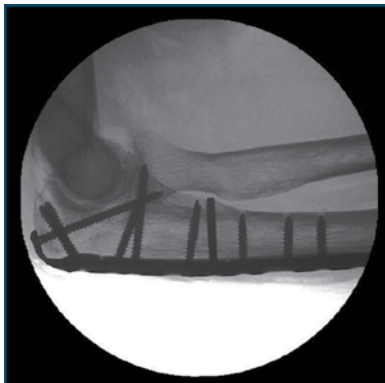
Using the Cannulated 3.0 PLS T-10 driver, thread the screw down the k-wire until the head of the screw contacts the plate.

Remove the k-wire and fully lock the screw to the plate using the non-cannulated T-10 driver.



PALS-30XXX-CC: Screw, Polyaxial Locking, 3.0mm x XXmm Cannulated, CoCr

26 FLUOROSCOPIC CONFIRMATION



Using fluoroscopic imaging, confirm that proper reduction has been maintained and that all screws are of proper length and fully engaged to the plate.

Confirm that all PDGs have been removed.

Where soft tissue attachment is preferred to support fracture reduction, an additional suture technique is described starting with step 27. If not required, proceed to step 35 for closure.

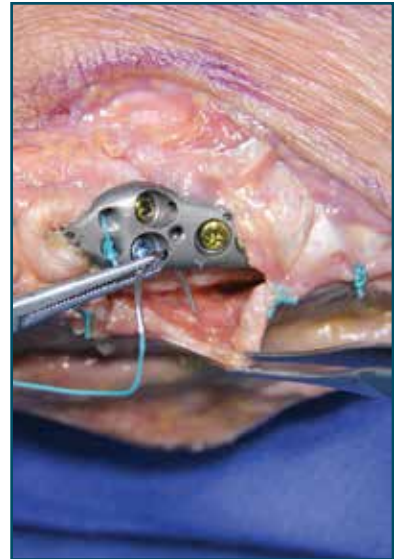
SOFT TISSUE ATTACHMENT POINTS (OPTIONAL)

27

All plates incorporate two suture attachment points proximal and distal to the olecranon screw holes that will accommodate a curved needle.

A. The triceps attachment points are beneficial to augment plate fixation when the triceps insertion is avulsed and osteoporotic or comminuted olecranon fractures are evident.

B. The fascia attachment points are beneficial for re-attaching the fascia when necessary.



BEGIN PASSING SUTURE

28

With the elbow in 90° flexion, mark a spot approximately 5mm distal to the home run tab.

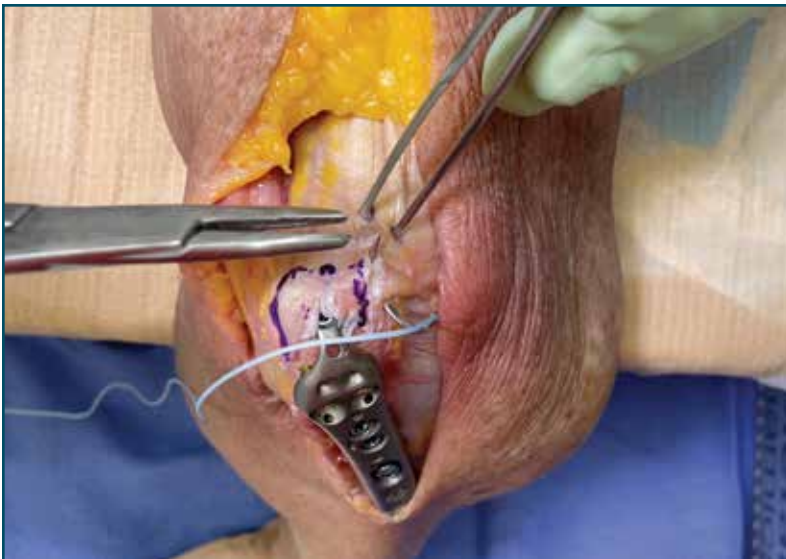


29 OUTLINE SUTURE PATH



Draw an outline as shown to mark the suture path.

30 BEGIN PASSING SUTURE

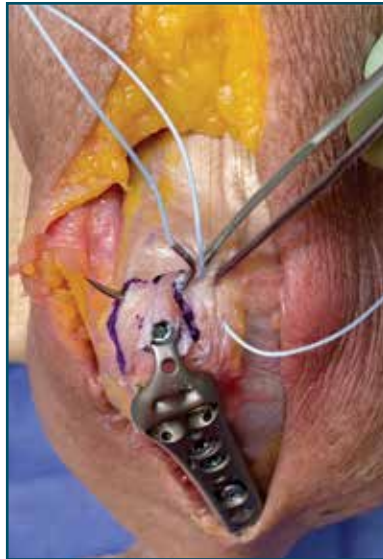


Begin a non-locked running stitch along the lateral side. Pass the suture deep to capture as much of the underlying tissue as possible.

CONTINUE PASSING SUTURE 31

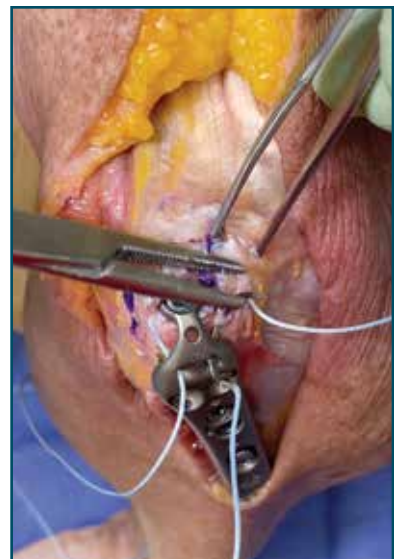
Continue passing the suture deep along the olecranon surface and the distal outline, incorporating Sharpey's fibers.

Continue the deep-running stitch medially.



PASS SUTURE THROUGH PLATE 32

Pass the suture through the medial suture hole of the plate, then pass the suture through the lateral suture hole of the plate.



33 TIE SLIDING KNOT



Tighten the suture to remove all slack. Pull suture limbs to confirm the suture slides within the tissue.

Tie and tension a sliding knot on the lateral side.

34 SECURE CONSTRUCT



Secure the construct with six additional surgeon knots. To avoid irritation of the soft tissue, ensure the knot stack is lateralized as much as possible.

Confirm that the ulnar nerve is free of any impingement.

Close deep to superficial in the usual fashion. Apply a standard long-arm post-op dressing as necessary.



PLATE BENDING (OPTIONAL) 36

If it is necessary to modify the shaft of the 151mm plate, attach the Bending Irons to bend the plate in any plane up to 10°.

A. Vertical Plane: Use section 1 of the Bending Irons.

B. Horizontal Plane: Use section 2 of the Bending Irons. This plate manipulation can also be performed in-situ.

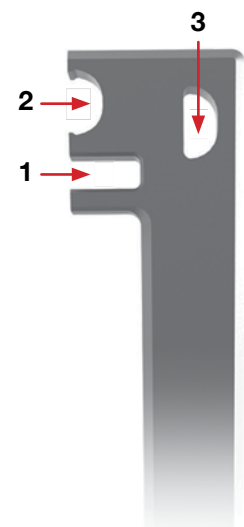
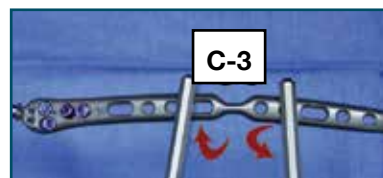
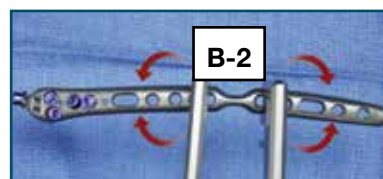
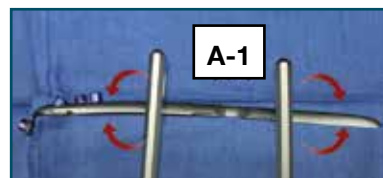
C. Transverse Plane: Use section 3 of the Bending Irons.

Note:

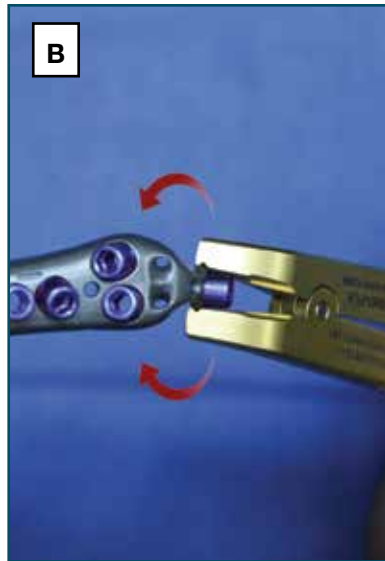
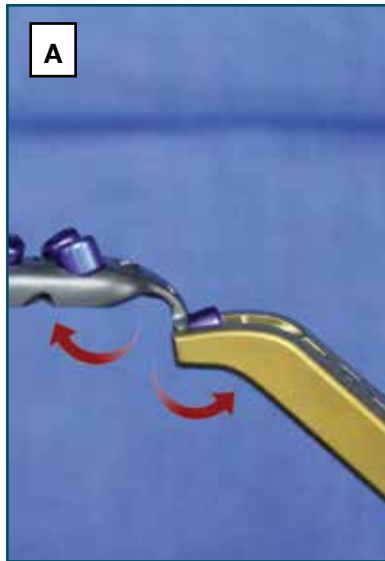
Do not exceed the respective maximum bend angles as described above.

Warning:

Bending may weaken or break the plate. Be sure to inspect the plate for damage prior to use.



37 HOME RUN TAB BENDING (OPTIONAL)



If it is necessary to modify the HR tab, firmly hold the plate, then grip the round node of the HR tab using the Bending Pliers and shape as intended.

A. Vertical Plane: Secure the Bending Plier to bend up to 30°.

B. Transverse Plane: Secure the Bending Plier to bend up to 45°.

Confirm that the new trajectory avoids contact with the articular surfaces and other screw trajectories using fluoroscopy.

Note:

Do not exceed the maximum bend angles as described above.

Warning:

Bending may weaken or break the plate. Be sure to inspect the plate for damage prior to use.

38 PROXIMAL ULNA PLATE EXTENSION (OPTIONAL)



Attach the Proximal Ulna Plate Extension to the Home Run Tab prior to applying the plate to the bone.

Using the 2.7mm x 80mm drill bit, drill through the drill guide, and measure the screw length using the appropriate scale on the 80mm Depth Gauge.

Warning: When drilling screw holes, be sure to avoid drilling into the articular surfaces.

Insert the appropriate length screw.

Warning: Care should be taken that no screws are placed in the joint.



PUPE-1HL: PUP Extension, 1 Hole



PUPE-2HL: PUP Extension, 2 Hole



DRLL-SSC-27080: Drill, 2.7mm x 80mm

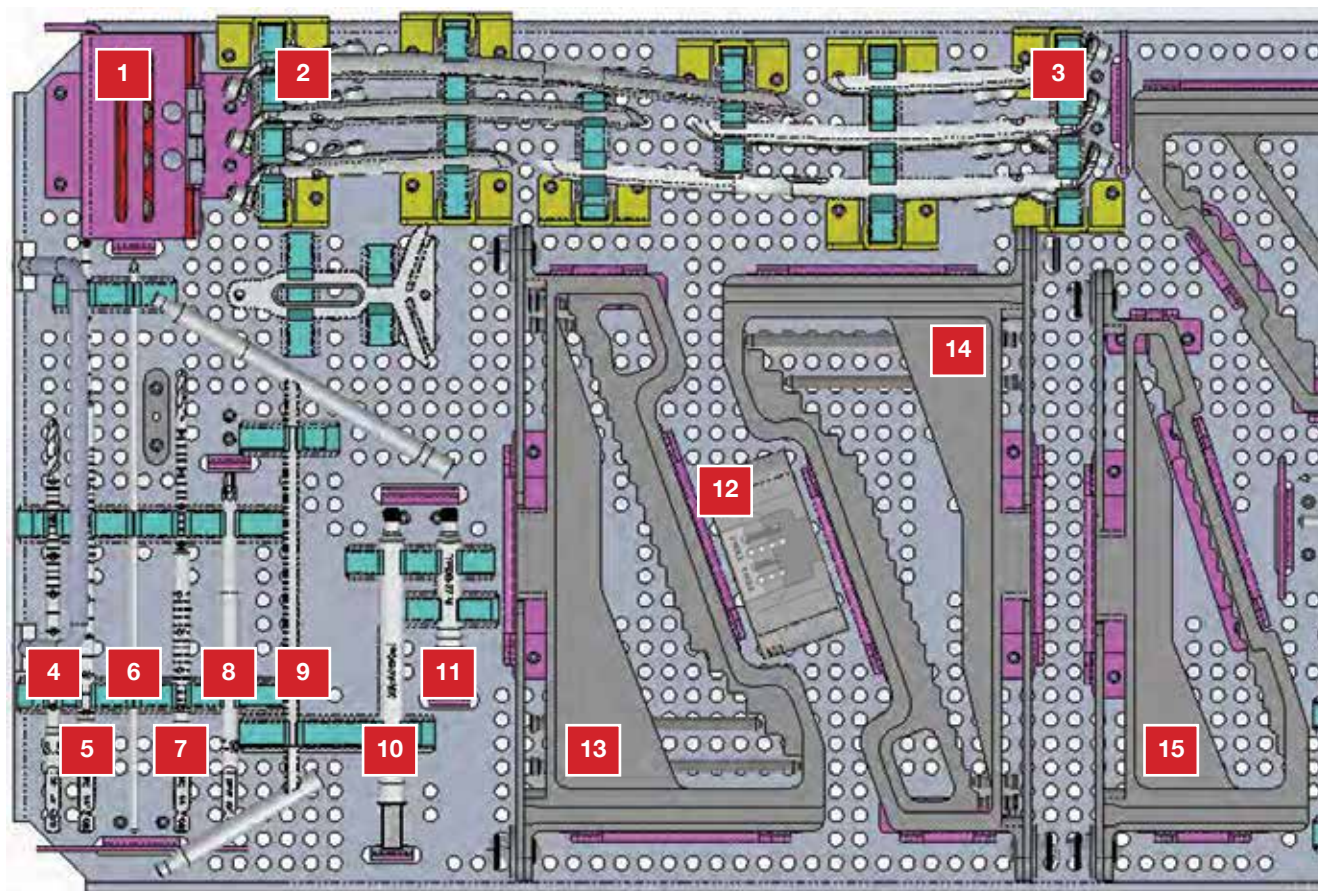


DPGA-UNV-080: Depth Gauge, Universal, 80mm

Clear any tissue overgrowth from the screw holes of the plate. Then proceed to remove the screws by inserting the corresponding screwdriver and turn counter clockwise.

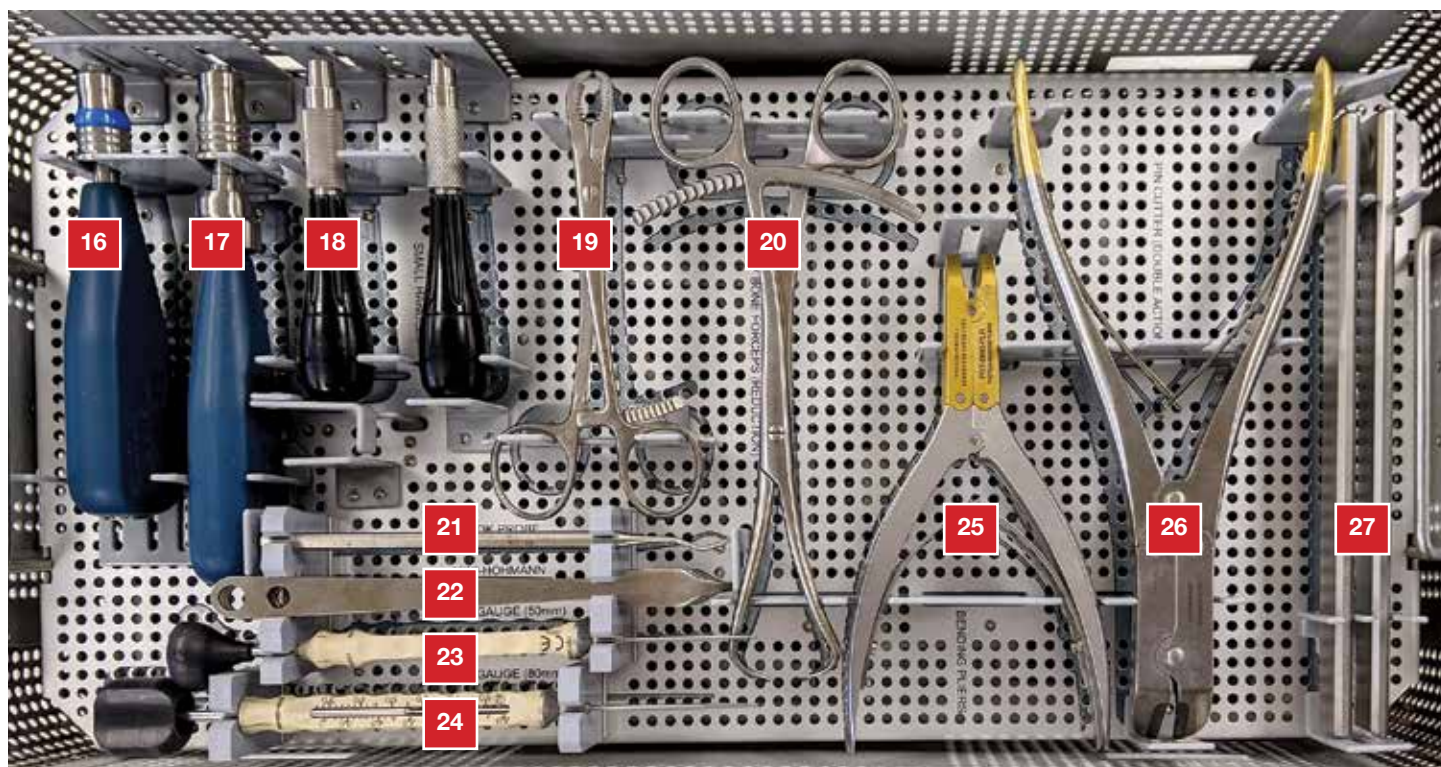
Once all the screws are removed, remove the plate.

INSTRUMENT TRAY (Standard Configuration)



Loc #	Catalog #	Description	Loc #	Catalog #	Description
1	PDG-AIM-020	PLS AIMing Guide, 1.1mm x 10°		MTNL-35200-TS	Screw, Multi-Thread Compression, 3.5mm x 20mm, Ti
2	APL-PUP-3HL	Proximal Ulna Plate, 73mm, Left		MTNL-35220-TS	Screw, Multi-Thread Compression, 3.5mm x 22mm, Ti
	APL-PUP-6HL	Proximal Ulna Plate, 108mm, Left		MTNL-35240-TS	Screw, Multi-Thread Compression, 3.5mm x 24mm, Ti
	APL-PUP-9HL	Proximal Ulna Plate, 151mm, Left		MTNL-35260-TS	Screw, Multi-Thread Compression, 3.5mm x 26mm, Ti
3	APL-PUP-3HR	Proximal Ulna Plate, 73mm, Right		MTNL-35280-TS	Screw, Multi-Thread Compression, 3.5mm x 28mm, Ti
	APL-PUP-6HR	Proximal Ulna Plate, 108mm, Right		MTNL-35300-TS	Screw, Multi-Thread Compression, 3.5mm x 30mm, Ti
	APL-PUP-9HR	Proximal Ulna Plate, 151mm, Right		MTNL-35320-TS	Screw, Multi-Thread Compression, 3.5mm x 32mm, Ti
4	DRLL-SSC-35070	Drill, 3.5mm x 70mm		MTNL-35340-TS	Screw, Multi-Thread Compression, 3.5mm x 34mm, Ti
5	DRLL-SSC-27080	Drill, 2.7mm x 80mm		MTNL-35360-TS	Screw, Multi-Thread Compression, 3.5mm x 36mm, Ti
6	KWIR-STD-20152	K-Wire, Standard Tip, 2.0 mm x 152 mm		MTNL-35380-TS	Screw, Multi-Thread Compression, 3.5mm x 38mm, Ti
7	DRLL-SSC-27040	Drill, Cannulated, PLS, 2.4mm x 40mm		MTNL-35400-TS	Screw, Multi-Thread Compression, 3.5mm x 40mm, Ti
8	DRVR-UQC-T10	Driver, 3.0 PLS, T-10		MTNL-35450-TS	Screw, Multi-Thread Compression, 3.5mm x 45mm, Ti
9	TPDG-DSD-XL	Tissue Protector/Drill Guide, Dual Sided, 2.7mm x 2.7mm,XL		MTNL-35500-TS	Screw, Multi-Thread Compression, 3.5mm x 50mm, Ti
10	TPDG-27-M	Thread-in Drill Guide, 2.7mm x 40mm, Multi-Thread		MTNL-35550-TS	Screw, Multi-Thread Compression, 3.5mm x 55mm, Ti
11	TPDG-27-MXL	Thread-in Drill Guide, 2.7mm, Multi-Thread, XL		MTNL-35600-TS	Screw, Multi-Thread Compression, 3.5mm x 60mm, Ti
12	PUPE-1HL	PUP Extension, 1 Hole		MTNL-35700-TS	Screw, Multi-Thread Compression, 3.5mm x 70mm, Ti
	PUPE-2HL	PUP Extension, 2 Hole			
13	MTNL-35080-TS	Screw, Multi-Thread Compression, 3.5mm x 8mm, Ti	14	MTLS-35080-TS	Screw, Multi-Thread Locking, 3.5mm x 8mm, Ti
	MTNL-35100-TS	Screw, Multi-Thread Compression, 3.5mm x 10mm, Ti		MTLS-35100-TS	Screw, Multi-Thread Locking, 3.5mm x 10mm, Ti
	MTNL-35120-TS	Screw, Multi-Thread Compression, 3.5mm x 12mm, Ti		MTLS-35120-TS	Screw, Multi-Thread Locking, 3.5mm x 12mm, Ti
	MTNL-35140-TS	Screw, Multi-Thread Compression, 3.5mm x 14mm, Ti		MTLS-35140-TS	Screw, Multi-Thread Locking, 3.5mm x 14mm, Ti
	MTNL-35160-TS	Screw, Multi-Thread Compression, 3.5mm x 16mm, Ti		MTLS-35160-TS	Screw, Multi-Thread Locking, 3.5mm x 16mm, Ti
	MTNL-35180-TS	Screw, Multi-Thread Compression, 3.5mm x 18mm, Ti		MTLS-35180-TS	Screw, Multi-Thread Locking, 3.5mm x 18mm, Ti
				MTLS-35200-TS	Screw, Multi-Thread Locking, 3.5mm x 20mm, Ti
				MTLS-35220-TS	Screw, Multi-Thread Locking, 3.5mm x 22mm, Ti
				MTLS-35240-TS	Screw, Multi-Thread Locking, 3.5mm x 24mm, Ti
				MTLS-35260-TS	Screw, Multi-Thread Locking, 3.5mm x 26mm, Ti
				MTLS-35280-TS	Screw, Multi-Thread Locking, 3.5mm x 28mm, Ti
				MTLS-35300-TS	Screw, Multi-Thread Locking, 3.5mm x 30mm, Ti
				MTLS-35320-TS	Screw, Multi-Thread Locking, 3.5mm x 32mm, Ti
				MTLS-35340-TS	Screw, Multi-Thread Locking, 3.5mm x 34mm, Ti
				MTLS-35360-TS	Screw, Multi-Thread Locking, 3.5mm x 36mm, Ti
				MTLS-35380-TS	Screw, Multi-Thread Locking, 3.5mm x 38mm, Ti
				MTLS-35400-TS	Screw, Multi-Thread Locking, 3.5mm x 40mm, Ti
				MTLS-35450-TS	Screw, Multi-Thread Locking, 3.5mm x 45mm, Ti
				MTLS-35500-TS	Screw, Multi-Thread Locking, 3.5mm x 50mm, Ti

INSTRUMENT TRAY (Standard Configuration)



Loc #	Catalog #	Description	Loc #	Catalog #	Description
15	MTLS-35550-TS	Screw, Multi-Thread Locking, 3.5mm x 55mm, Ti	22	INST-MHR-STD	Instrument, Mini-Hohmann Retractor, Standard
	MTLS-35600-TS	Screw, Multi-Thread Locking, 3.5mm x 60mm, Ti	23	DPGA-UNV-050	Depth Gauge, Universal, 50mm
	MTLS-35700-TS	Screw, Multi-Thread Locking, 3.5mm x 70mm, Ti		24	DPGA-UNV-080
	PANL-35080-TS	Screw, Cortical Non Locking, 3.5mm x 08mm, Ti	25		PRT-BND-PLR
	PANL-35100-TS	Screw, Cortical Non Locking, 3.5mm x 10mm, Ti		26	CTP-PI-2233
	PANL-35120-TS	Screw, Cortical Non Locking, 3.5mm x 12mm, Ti	27		DES-PUP-BND
	PANL-35140-TS	Screw, Cortical Non Locking, 3.5mm x 14mm, Ti		DPGA-PLS-030	Cannulated Depth Gauge, Polyaxial Locking Screw, 3.0mm*
	PANL-35160-TS	Screw, Cortical Non Locking, 3.5mm x 16mm, Ti			
	PANL-35180-TS	Screw, Cortical Non Locking, 3.5mm x 18mm, Ti			
	PANL-35200-TS	Screw, Cortical Non Locking, 3.5mm x 20mm, Ti			
	PANL-35220-TS	Screw, Cortical Non Locking, 3.5mm x 22mm, Ti			
	PANL-35240-TS	Screw, Cortical Non Locking, 3.5mm x 24mm, Ti			
	PANL-35260-TS	Screw, Cortical Non Locking, 3.5mm x 26mm, Ti			
	PANL-35280-TS	Screw, Cortical Non Locking, 3.5mm x 28mm, Ti			
	PANL-35300-TS	Screw, Cortical Non Locking, 3.5mm x 30mm, Ti			
	PANL-35320-TS	Screw, Cortical Non Locking, 3.5mm x 32mm, Ti			
	PANL-35340-TS	Screw, Cortical Non Locking, 3.5mm x 34mm, Ti			
	PANL-35360-TS	Screw, Cortical Non Locking, 3.5mm x 36mm, Ti			
	PANL-35380-TS	Screw, Cortical Non Locking, 3.5mm x 38mm, Ti			
	PANL-35400-TS	Screw, Cortical Non Locking, 3.5mm x 40mm, Ti			
	PANL-35420-TS	Screw, Cortical Non Locking, 3.5mm x 42mm, Ti			
	PANL-35440-TS	Screw, Cortical Non Locking, 3.5mm x 44mm, Ti			
16	HNDL-UQC-RTC	Handle, Universal QC, Ratcheting (ALIGN)			
17	HNDL-UQC-FXD	Handle, Universal Quick Connect, Fixed			
18	HNDL-SQC-FXD	Handle, Small QC, Fixed			
19	FRCP-BHM-RTC	Forceps, Bone Holding Medium, Ratcheting			
20	FRCP-BHL-RTP	Large Reduction Forceps			
21	INST-SHP-STD	Instrument, Sharp Hook Probe, Standard			

*Not pictured



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