SURGICAL TECHNIQUE GUIDE

GEMINUS®

distal radius system

As described by:

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skeletal dynamics®
Innovation Based on Science

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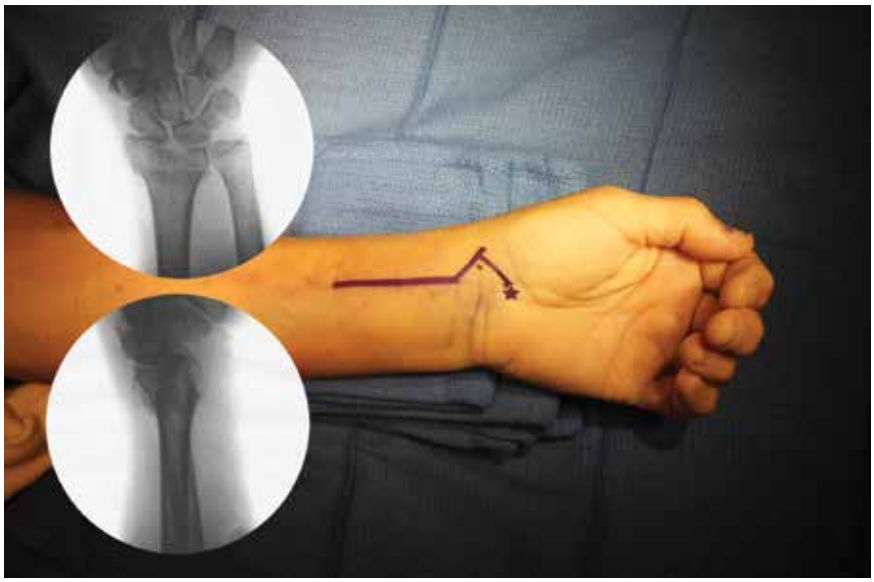
Extended FCR Surgical Approach

1 EXPOSURE

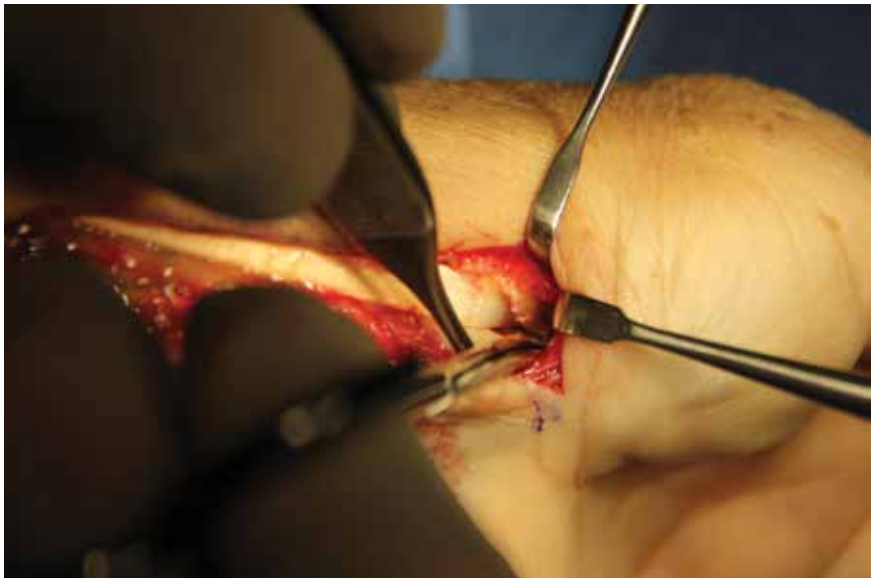
Make an incision ~ 8cm long over the course of the Flexor Carpi Radialis (FCR) tendon.

NOTE:
The incision should start distally at the level of the trapezial ridge(★), then cross the wrist flexion creases in a zigzag fashion.



2 RELEASE THE FCR TENDON SHEATH

Open the sheath of the FCR tendon and dissect distally past the level of the superficial radial artery.

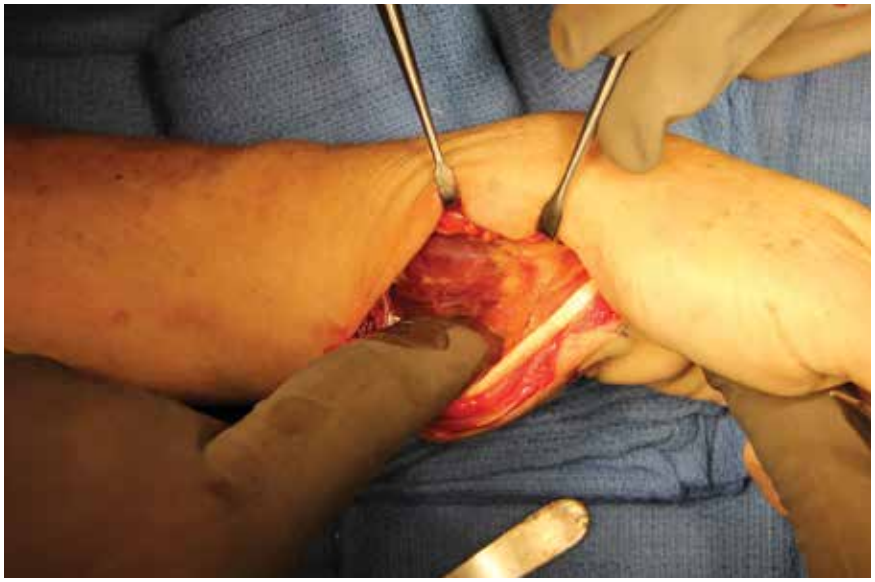


CROSSING THE DEEP FASCIA 3

Retract the FCR tendon ulnarly while protecting the median nerve.

Incise through the floor of the FCR tendon sheath distally to the level of the trapezium.

MID-LEVEL DISSECTION 4



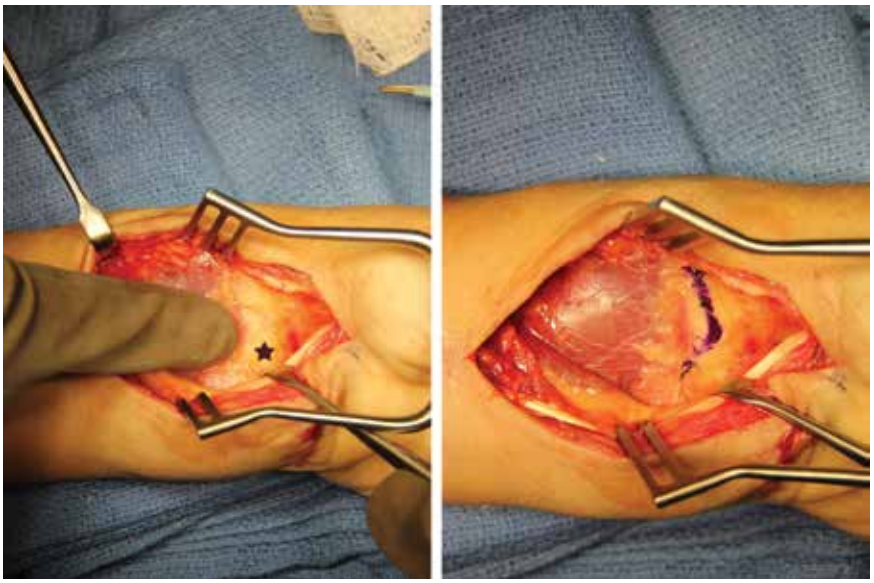
Widely develop the subtendinous space of Parona and expose the Pronator Quadratus (PQ) muscle.

5 IDENTIFYING THE WATERSHED LINE

Identify and mark the location of the **watershed line**; it is best found by palpating for the volar rim of the lunate fossa (★).

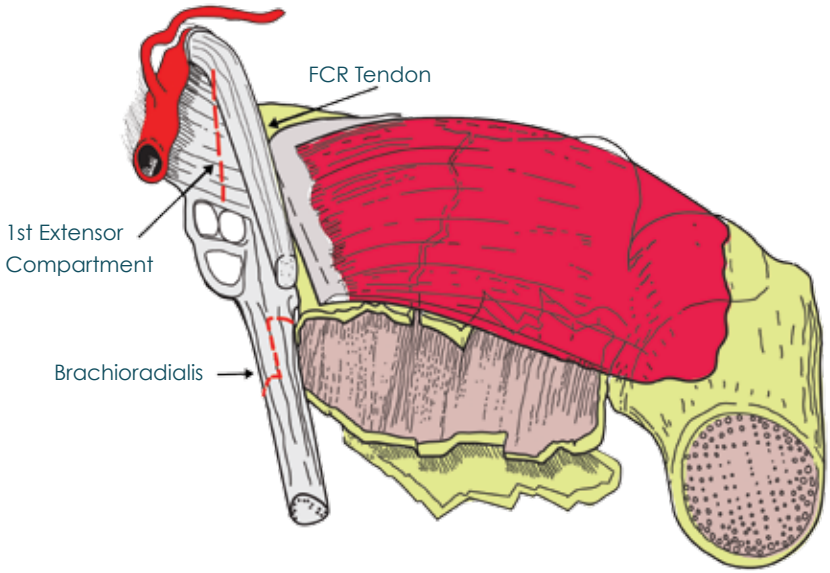
Note:
The Transitional Fibrous Zone (TFZ) is a 1cm wide band of fibrous tissue located between the watershed line and the PQ muscle.

The TFZ must be elevated to properly expose the radius and position the plate.

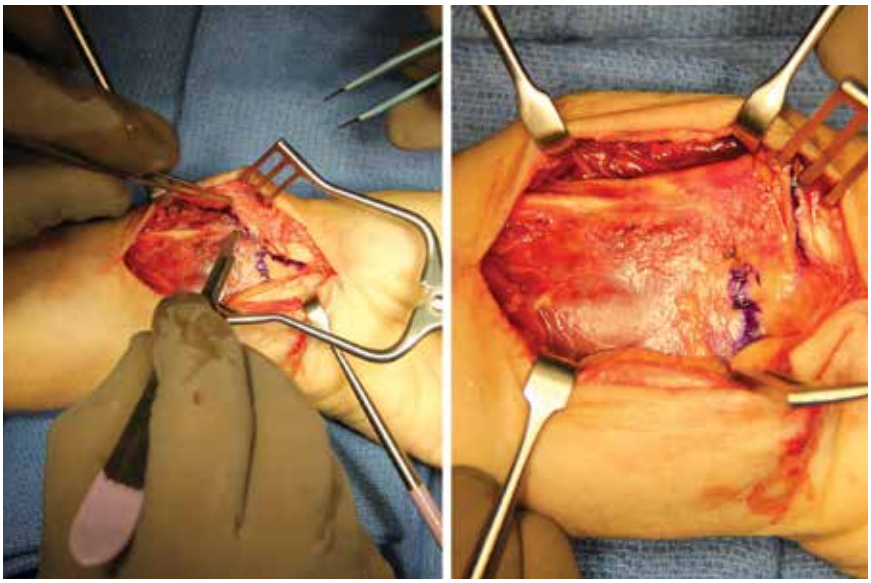


6 THE RADIAL SEPTUM

The radial septum is a complex fascial structure formed by the intermuscular membrane, the first extensor compartment, the insertion of the brachioradialis and the distal part of the FCR tendon sheath.



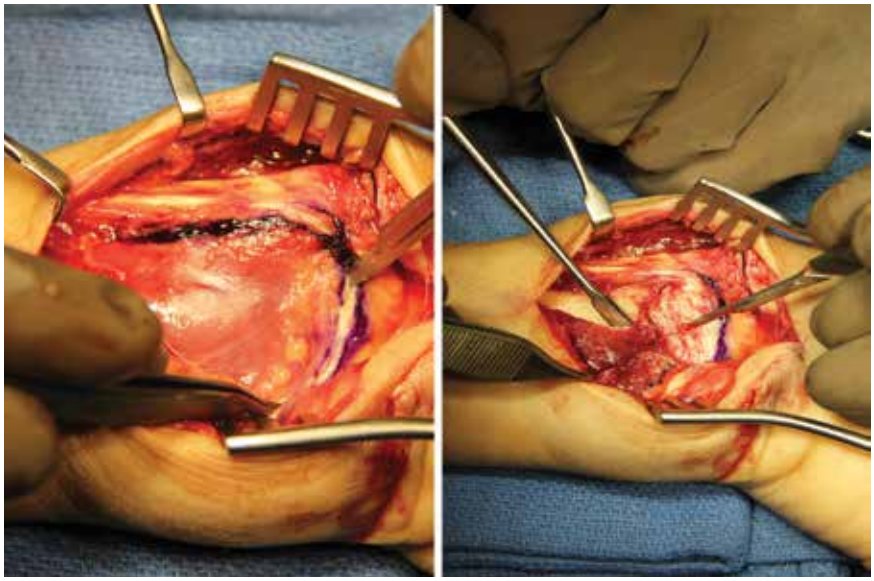
RELEASING THE RADIAL SEPTUM 7



Release the radial septum by incising the intermuscular membrane at the radial border of the brachioradialis.

Carry this release distally while protecting the radial artery and sensory nerve.

ELEVATING THE PQ MUSCLE 8



Incise and elevate the TFZ using a scalpel to properly expose the radius and position the plate.

The PQ muscle is frequently avulsed from its distal attachment to the TFZ. Use a periosteal elevator to lift the PQ muscle from the radius.

Note:
The origin of the Flexor Pollicis Longus (FPL) muscle may be partially released for added exposure.

9 RELEASE OF THE BRACHIORADIALIS

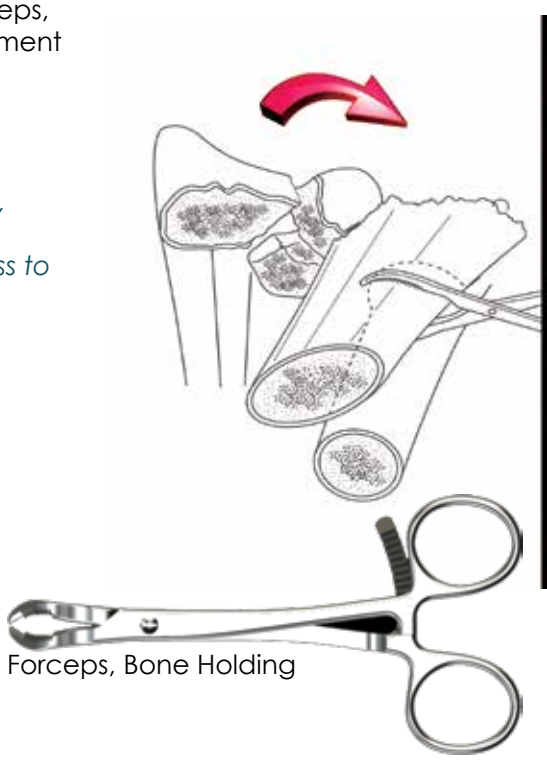
Release the insertion of the brachioradialis using a step cut tenotomy in order to facilitate later repair.

Note:
The brachioradialis is the prime deforming force of the distal radius fracture.

10 INTRA-FOCAL EXPOSURE

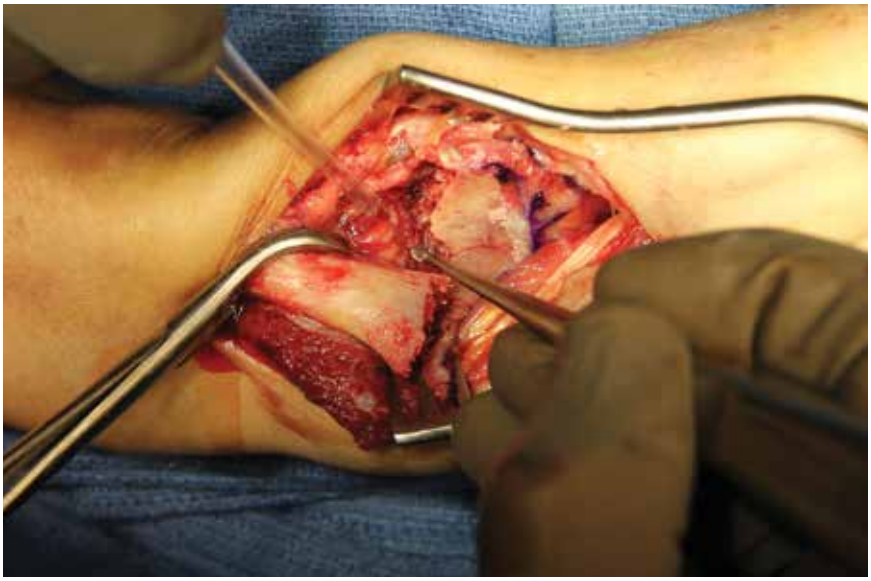
Using bone-holding forceps, rotate the proximal fragment into pronation.

Note:
This provides ample exposure of the fracture, allowing for a thorough debridement and access to articular fragments.



Forceps, Bone Holding

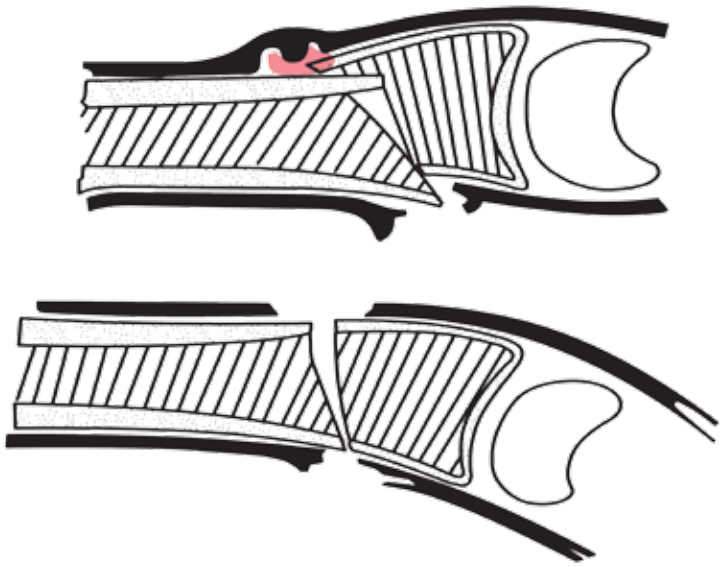
DEBRIDING THE FRACTURE SITE 11



It is necessary to remove the clot, fibrous tissue and callus to achieve a proper reduction for complex articular or partially healed fractures.

Note:
Preserve the soft tissue attachments to the medial aspect of the proximal fragment. Here, perforators from the anterior interosseous artery feed the proximal radial shaft.

RELEASING THE DORSAL PERIOSTEUM 12



In some inveterate fractures, it may be necessary to release or excise the thickened dorsal periosteum to achieve a proper reduction.

13 INITIAL FRACTURE REDUCTION

Supinate the proximal radius back into place and reduce the volar cortex.

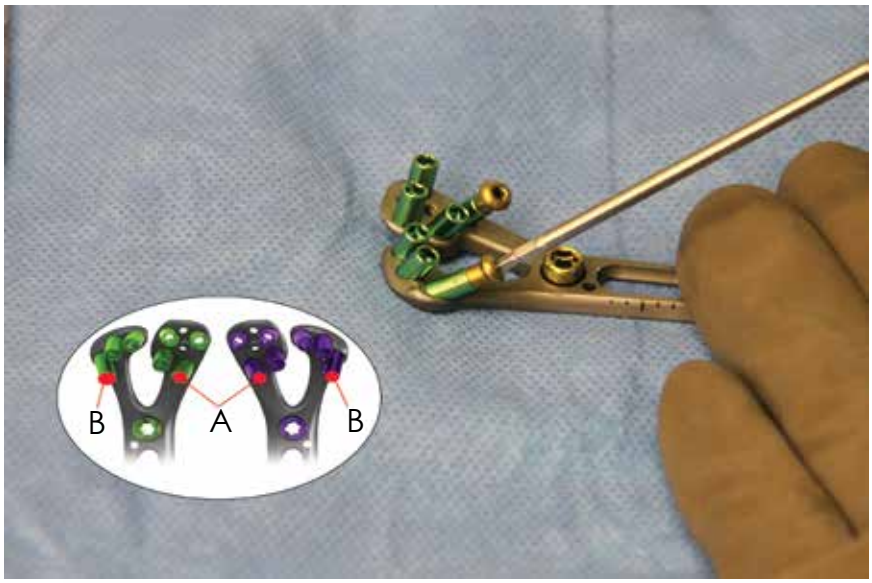
Note:
Providing traction to the hand and the use of a bolster facilitates reduction.

14 PRE-LOADING K-WIRE A.I.M.ING GUIDES

Select two A.I.M.ing Guides and thread them into the pre-loaded drill guide (PDG) at the proximal ulnar hole (A) of the lunate head, and at the most radial hole (B) of the scaphoid head.

NOTE:
Each A.I.M.ing Guide positions the K-wire in the axis of the corresponding peg.

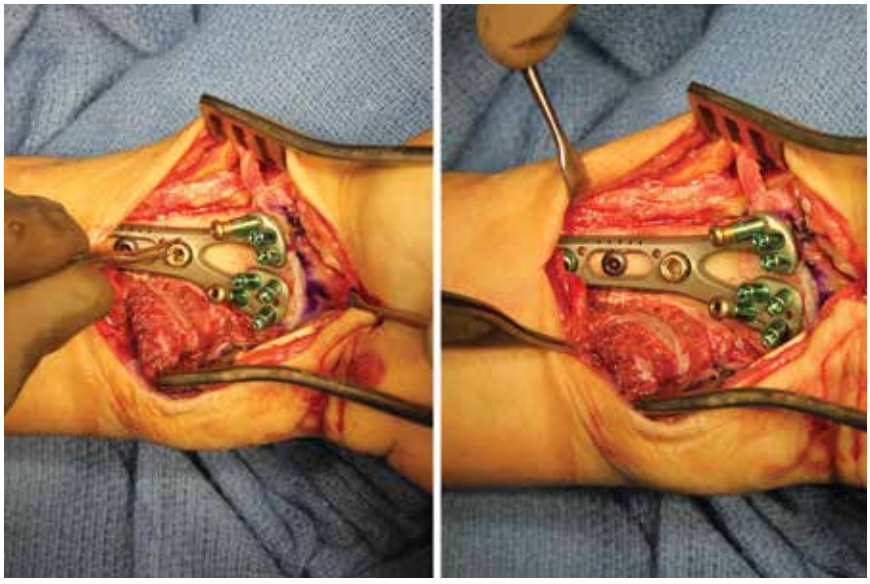
The Square Tip Driver is designed to break in an area that will allow for easy removal if excess torque is applied.



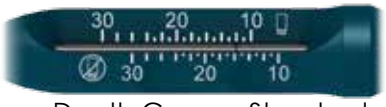
Driver, Square Tip 2.0mm

For the Distal Fragment First technique, refer to page 28

PROXIMAL PLATE FIXATION 15



Drill, 2.5mm



Depth Gauge, Standard

Driver, Quick Connect T10

Position the lunate head of the GEMINUS Plate approximately 2mm proximal to the volar rim of the lunate fossa (watershed line).

Align the proximal portion of the plate to the radial shaft, then drill through the center of the gliding hole using the 2.5mm bit.

Using the appropriate scale of the Depth Gauge, measure and then insert a 3.5mm compression screw (Non Locking Cortical Screw).

NOTE:
To avoid contact with flexor tendons, the plate must be applied just proximal to and below the watershed line.

FINAL FRACTURE REDUCTION 16

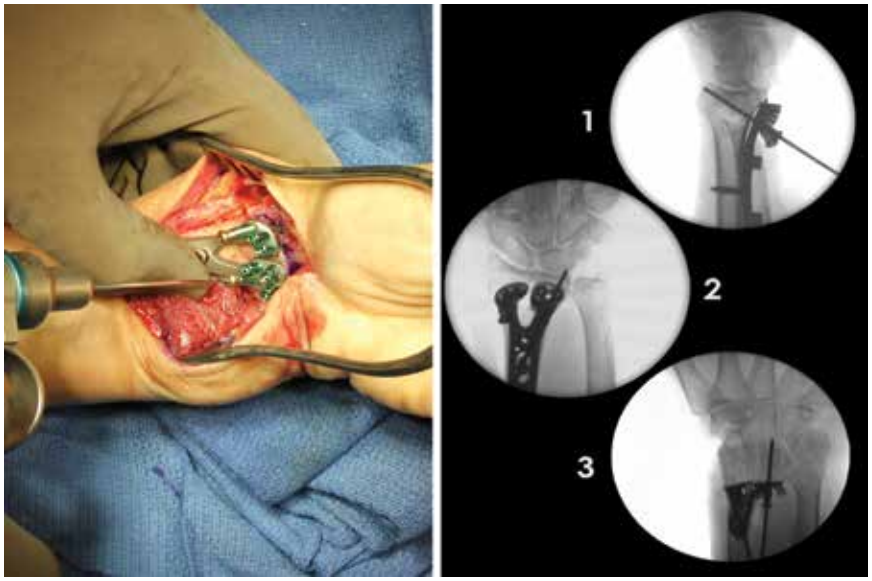
Using the GEMINUS plate as a template, apply longitudinal traction and direct pressure over the dorsal aspect of the radius to reduce the fracture.

It is important that the distal edge of the plate is flush to the surface of the radius.

17 LUNATE FOSSA - PROVISIONAL FIXATION

Reduce and fix the lunate fossa fragment(s) to the lunate head of the GEMINUS plate using a 1.5mm K-wire through the A.I.M.ing Guide.

Confirm the proper placement of the K-wire approximately 2mm below the subchondral bone in the 20˚ elevated lateral view (1) and below the subchondral plate of the DRUJ in the AP view (2). A tangential view of the distal radius is useful at this step(3).



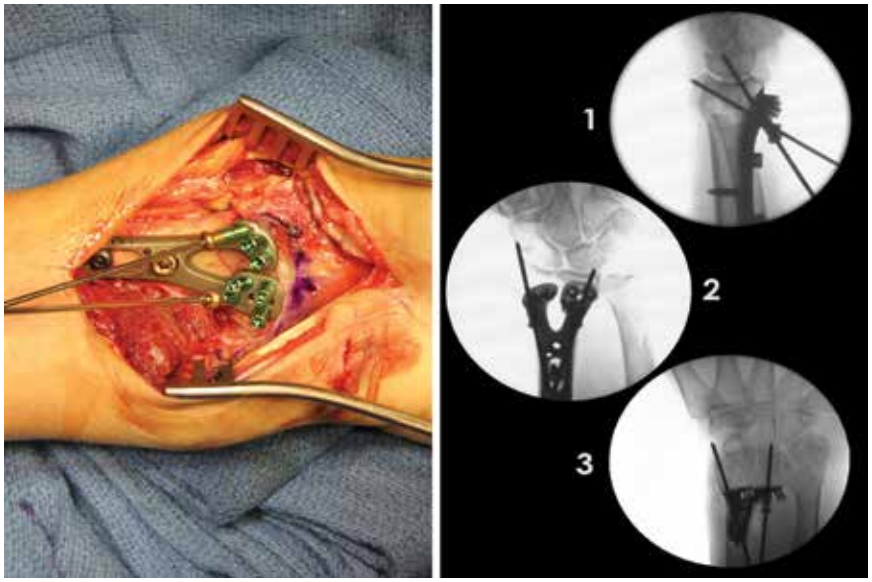
K-wire, 1.5mm

18 SCAPHOID FOSSA - PROVISIONAL FIXATION

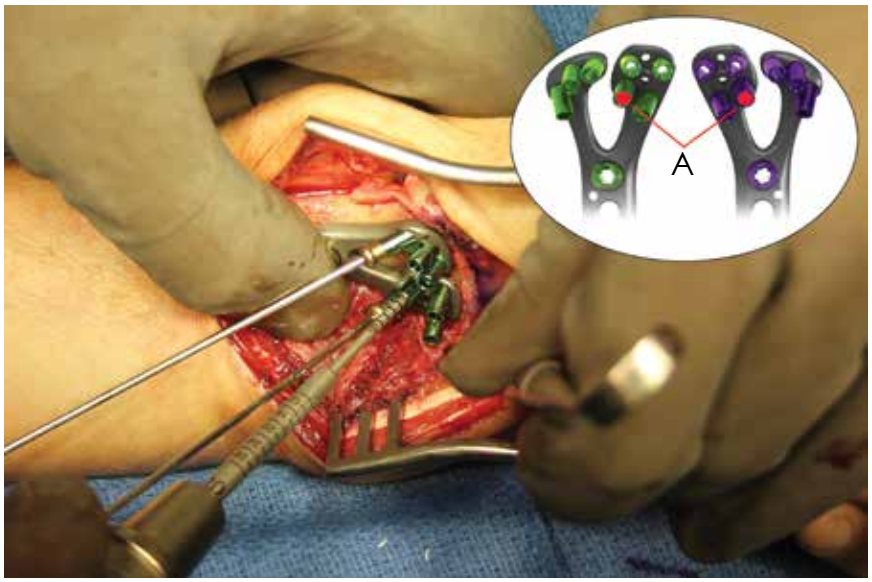
If present, reduce and fix the scaphoid fossa fragment to the previously reduced lunate fossa fragment(s).

Once proper placement is confirmed, bend the K-wires out of the way to facilitate drill insertion.

Note:
K-wires also aid in centering the plate to the distal fragments.



PILOT HOLE PREPARATION 19



Using the 2.0mm bit, drill through the PDG of the medial proximal hole of the lunate head (A).

Measure the peg length using the Depth Gauge taking note of the appropriate scale.

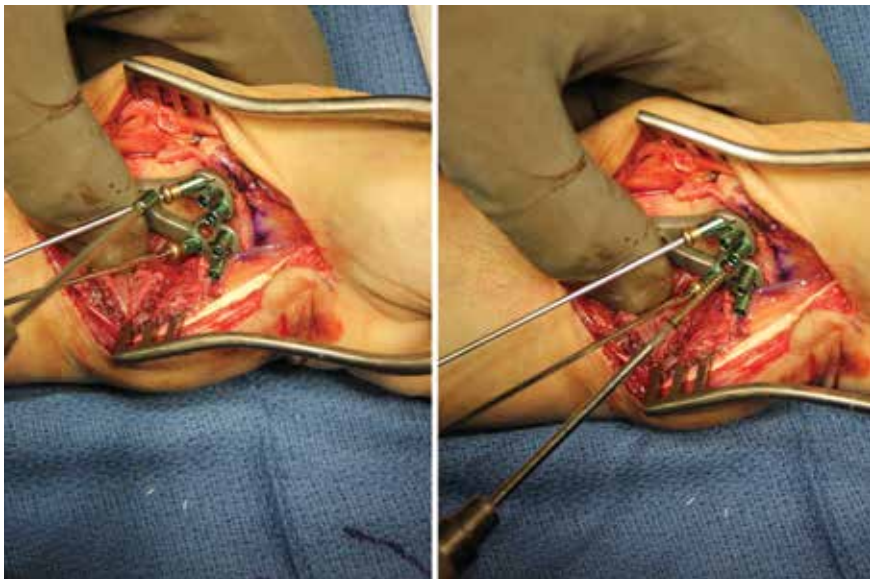
Note:
Each hole should be prepared sequentially

Caution:
Prevent excessive peg length as this can potentially cause tendon irritation.

Drill, 2.0mm

The Depth Gauge has a dual scale to reflect measurements either through the pre-loaded drill guides (top scale) or without pre-loaded drill guides (bottom scale).

PLATE COMPRESSION 20



Remove the PDG using the Peg Driver.

Insert a High Compression Locking Peg to compress the plate down to the bone.

Apply direct pressure over the dorsal aspect of the radius prior to locking the screw to the plate to achieve full compression.

Note:
High Compression Locking Pegs help to reduce and stabilize dorsal fragments by means of a differential pitch effect.

If re-drilling of the hole is necessary, use the appropriate Thread-in Drill Guide to facilitate this step.

High Compression Locking Peg

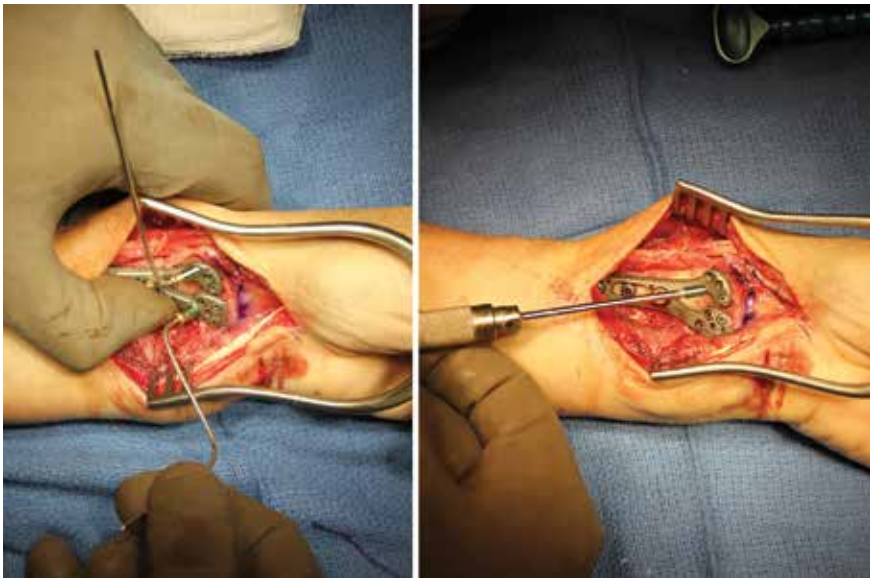
Thread-In Drill Guide, 2.0mm

21 PEG PREPARATION

Prepare all remaining available peg holes and insert locking pegs or screws.

Now remove the K-wires and A.I.M.ing guides and complete the holes.

WARNING:
Use only one High Compression Locking Peg per head.



Smooth Locking Peg

Threaded Locking Peg

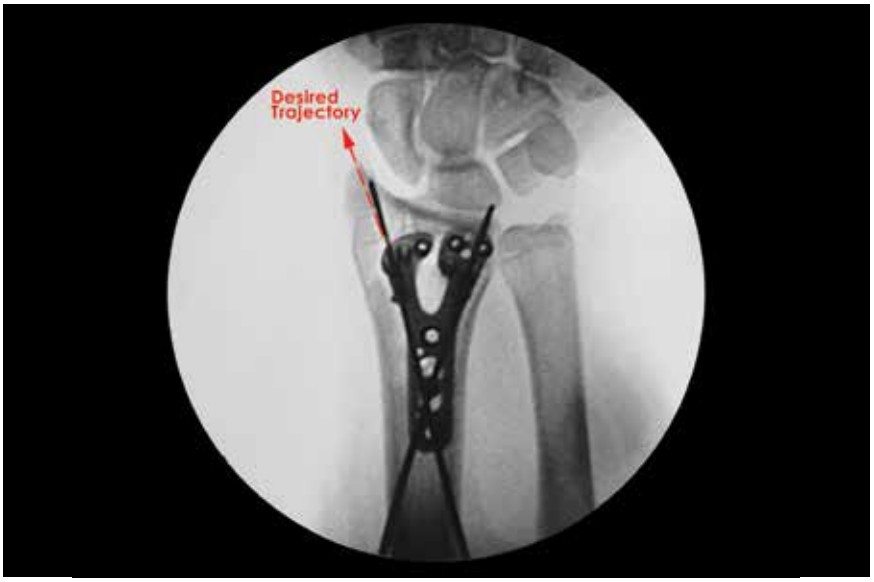
22 POLYAXIAL LOCKING SCREW OPTION

In situations where a peg is not optimally positioned, the Polyaxial Locking Screw (PLS) allows you to insert a screw in a desired trajectory different than the one determined by the plate.

Please refer to the "Polyaxial Locking Screw Surgical Steps" section located on page 20 of this surgical technique to review the steps and instrumentation.

WARNING:
Do not use a PLS in the most distal hole(s) of the lunate head.

Use only one PLS per head.



Polyaxial Locking Screws, Cannulated

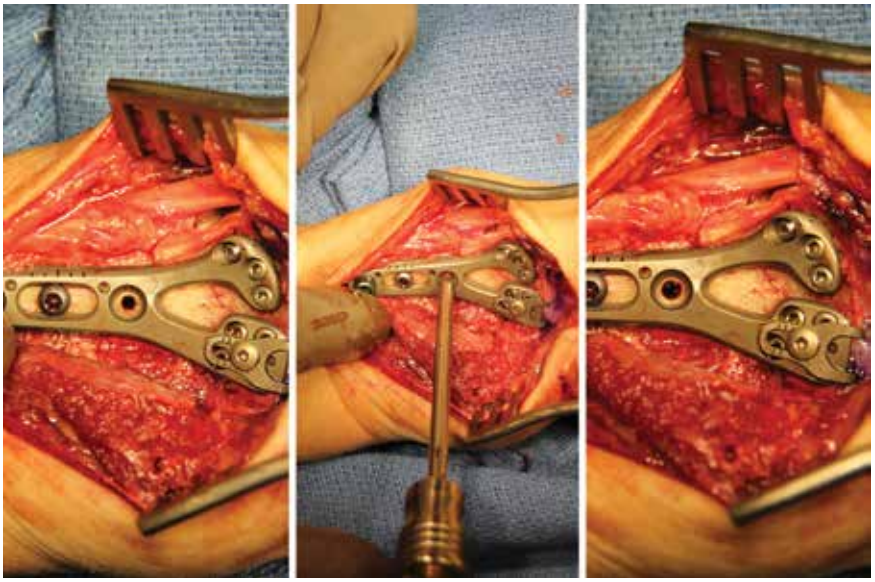
HOOK PLATE EXTENSION OPTION 23

The GEMINUS Volar Plating System includes a Hook Plate Extension (HPE) to provide increased fixation of the volar marginal fragment (VMF).

After the fracture has been reduced and fixed with the GEMINUS plate, an unstable VMF may be noted.

Please refer to the "Hook Plate Extension (HPE) Surgical Steps" section located on page 24 of this surgical technique to review the steps and instrumentation.

PROXIMAL PLATE FIXATION 24



1 **2** **3**

Driver, Quick Connect T10

Thread-In Drill Guide, 2.5mm

Drill through the PDG's using the 2.5mm bit.

Measure the screw length using the Depth Gauge taking note of the correct scale.

Remove the PDG using the T-10 driver and insert the appropriate length 3.5mm compression screw (Non Locking Cortical screw) (1) .

If using a 3.5mm locking screw instead, you must enlarge the near cortex drill hole using the tip of the T-10 driver (2).

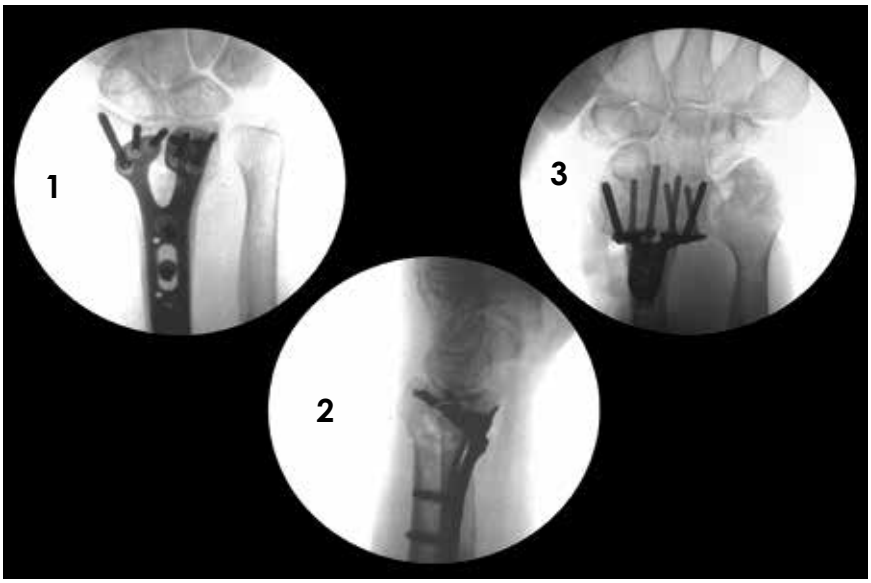
Now insert the appropriate length 3.5mm Cortical Locking screw (3).

Repeat for all remaining proximal screw holes.

25 FINAL RADIOGRAPHS

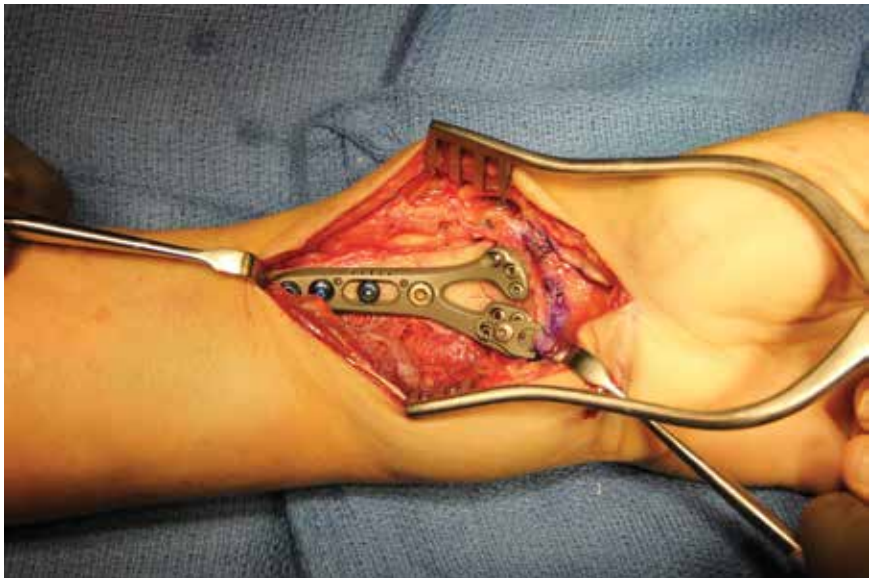
Confirm reduction, proper peg length and placement in the AP view (1), a 20˚ elevated lateral fluoroscopic view (2) and by rotating the wrist under fluoroscopy using a tangential view (3).

WARNING:
Remove ALL PDG's and A.I.M.ing Guides.

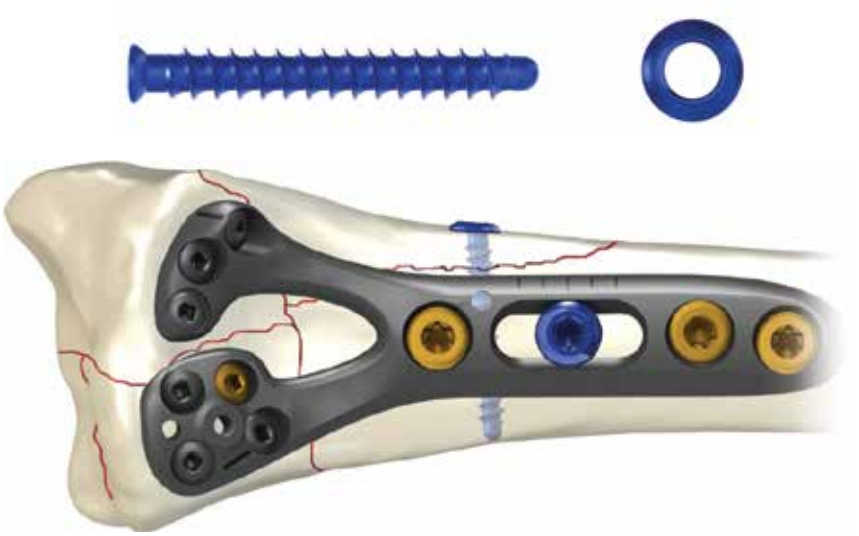


26 FINAL CONFIRMATION

Confirm that ALL pegs and screws have been fully tightened prior to wound closure.



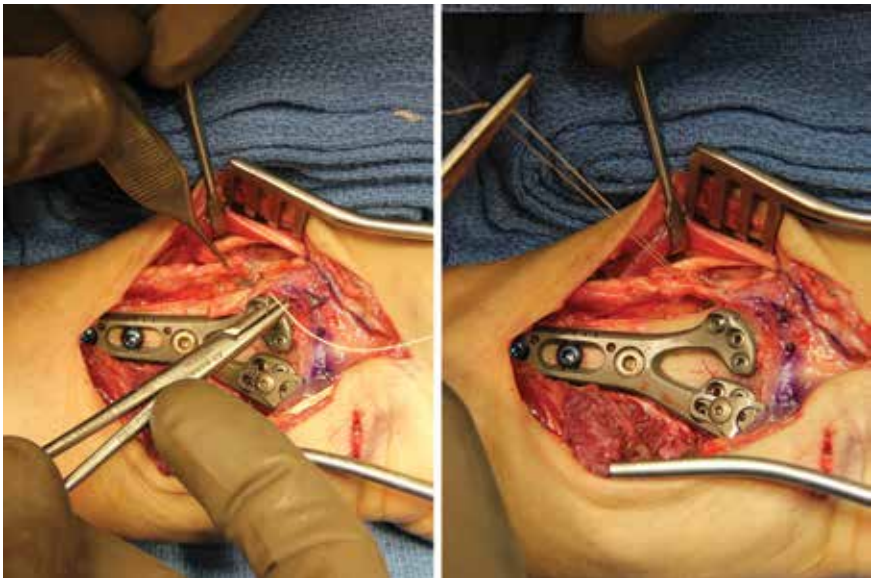
OPTIONAL WASHERS 27



By using a washer, the 2.7mm fully Threaded Non Locking Peg can be used to lag bone fragments when necessary.

Note:
The flat side of the washer should be placed on the bone surface.

BRACHIORADIALIS REPAIR 28



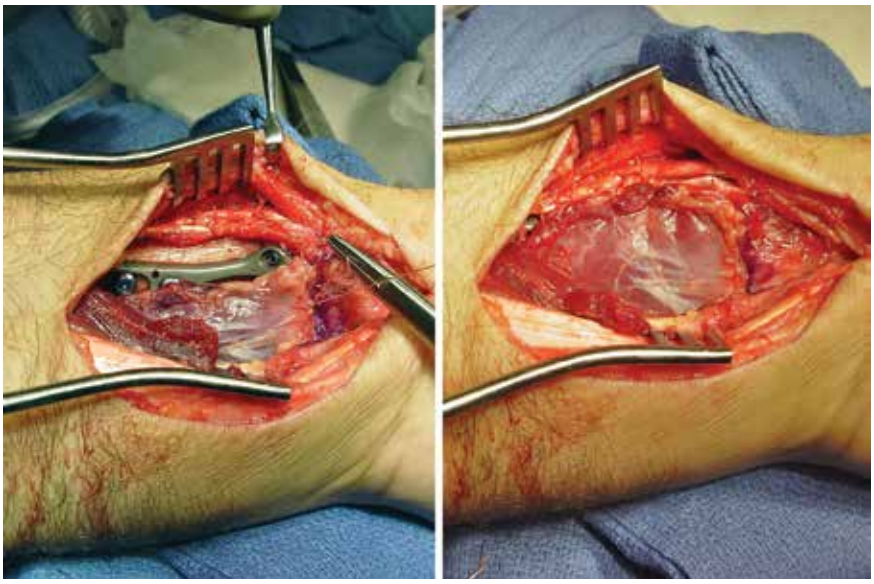
Repair the brachioradialis in a side-to-side fashion to serve as an attachment point for the PQ muscle.

29 TRANSITIONAL FIBROUS ZONE REPAIR

Repair the TFZ in order to cover the distal edge of the GEMINUS plate. This serves to further protect the flexor tendons.

30 PRONATOR QUADRATUS REPAIR

Now suture the PQ muscle to the repaired brachioradialis and TFZ.



FCR TENDON REPOSITIONING 31

Suture the FCR tendon back to its sheath to support the distal pole of the scaphoid.

WOUND CLOSURE 32

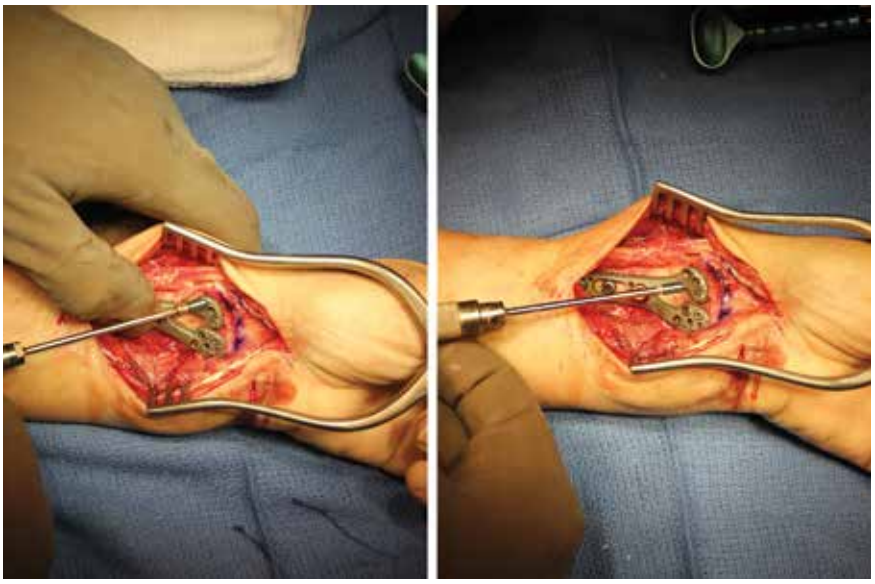
Close the incision in your normal fashion.

Polyaxial Locking Screw (PLS) Surgical Steps

1 PLATE PREPARATION

The PLS is designed to be inserted over a guide wire to assure accuracy.

Remove the desired A.I.M.ing and/or PDG from the plate.

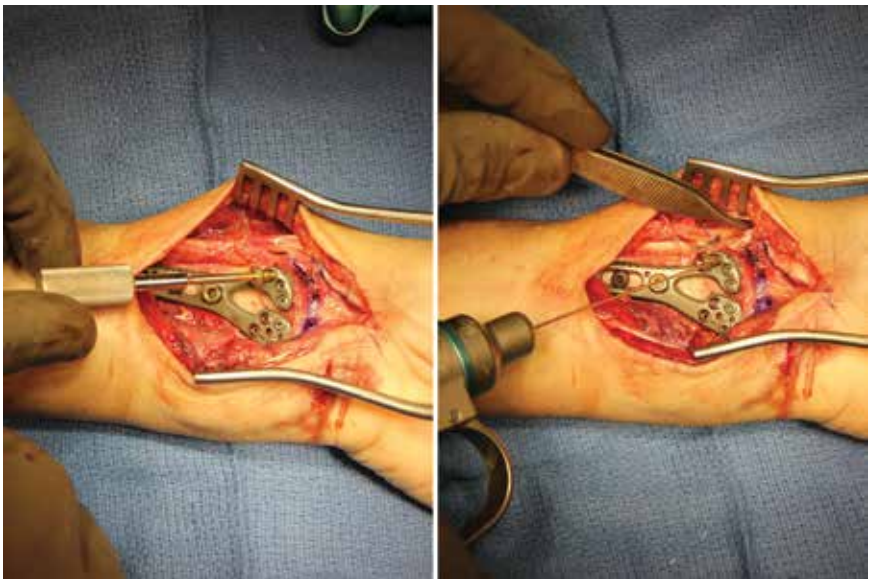


2 ESTABLISHING DESIRED TRAJECTORY

Use the cannulated Initial Driver to secure the PLS A.I.M.ing Guide to the plate.

Insert the gold end of the .9mm K-wire through the PLS A.I.M.ing Guide in the desired trajectory until the far cortex is reached. Confirm the desired placement using fluoroscopy.

NOTE:
The maximum angulation of the PLS should not exceed 10˚ from the trajectory of the respective fixed angle hole.



Initial Driver, PLS

PLS A.I.M.ing Guide

K-Wire, 0.9mm

MEASURING SCREW LENGTH 3

Slide the Initial Driver down the K-wire to engage and remove the PLS A.I.M.ing Guide.

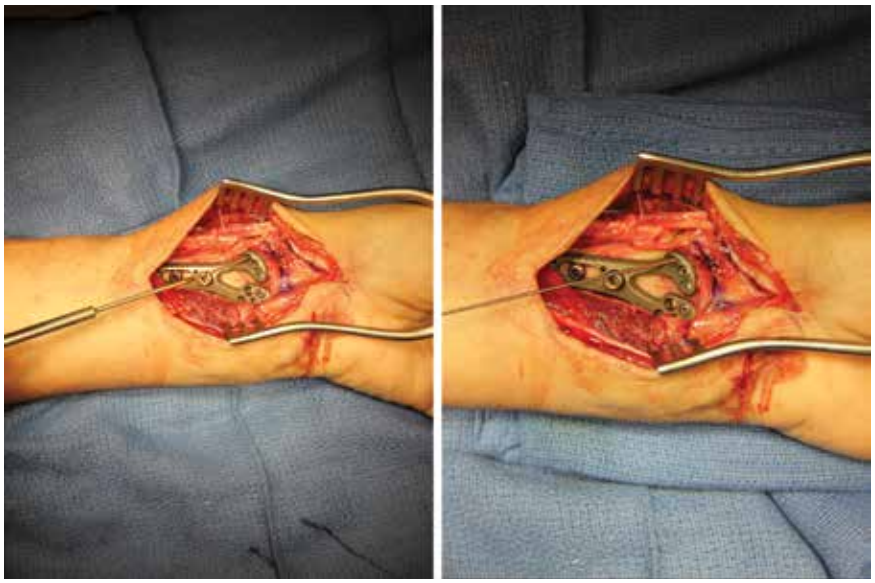
Option 1
Confirm that the tip of the K-wire is at the intended position. Slide the PLS Depth Gauge over the K-wire until flush against the plate to measure screw length.

Option 2
The GEMINUS system's Depth Gauge can also be used. However, the 0.9mm K-wire must first be removed then reinserted and proper replacement confirmed using fluoroscopy.

Option 1

Option 2

PILOT HOLE PREPARATION 4

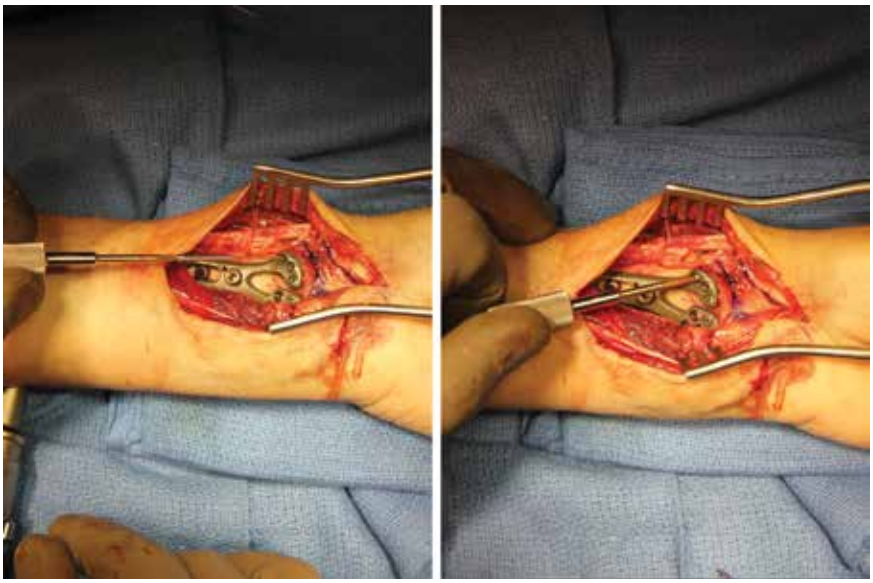


Drill over the K-wire using the 2.0mm Cannulated Drill, then remove it leaving the K-wire in place.

Drill, Cannulated, 2.0mm

5 SCREW INSERTION

Using the Cannulated Initial Driver, insert the appropriate PLS over the guide-wire and into the desired trajectory until the head of the PLS engages the plate.

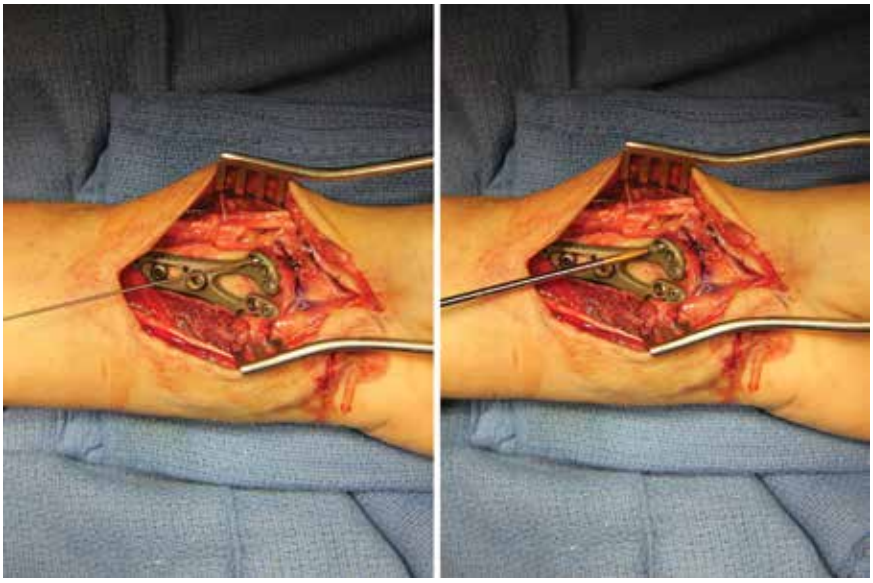


Initial Driver, PLS

6 LOCKING THE SCREW

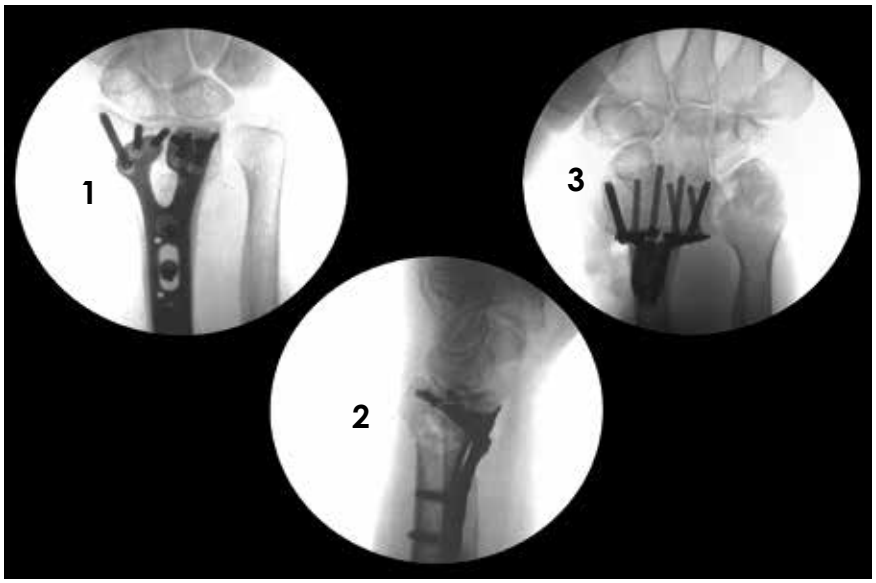
Remove the Initial Driver and K-wire.

Using the stronger Non-cannulated PLS Final Driver, be sure to fully seat and lock the PLS into the plate.



Final Driver, PLS

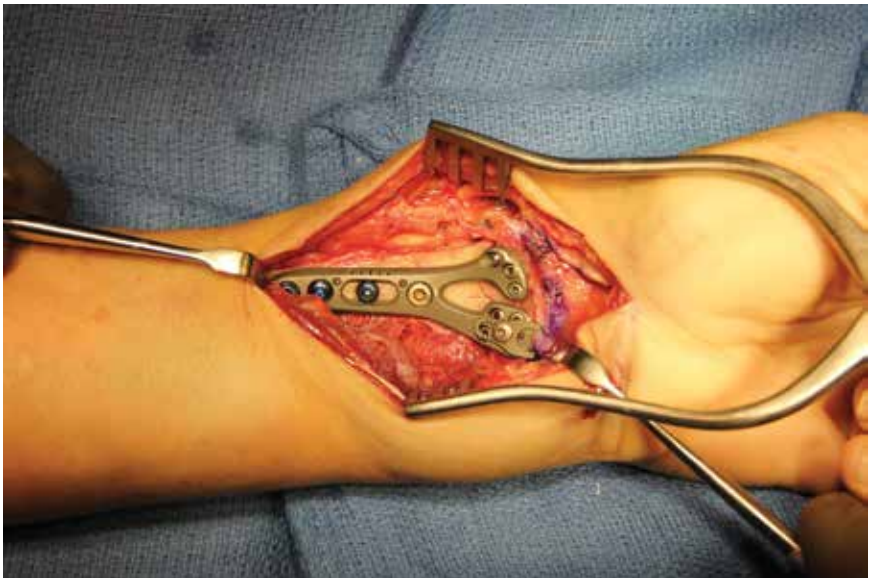
FINAL RADIOGRAPHS 7



Confirm reduction, proper screw length and placement in the AP view (1), a 20˚ elevated lateral fluoroscopic view (2) and by rotating the wrist under fluoroscopy using a tangential view (3).

WARNING:
Remove ALL PDG's and A.I.M.ing Guides.

FINAL CONFIRMATION 8



Confirm that ALL pegs and screws have been fully tightened prior to wound closure.

Refer to page 17, steps 28-32 for soft tissue repairs and wound closure.

Optional Hook Plate Extension (HPE) Surgical Steps

1 GUIDE WIRE PLACEMENT

Advance a 1.5mm K-wire through the central HPE screw hole (A) located on the lunate head of the GEMINUS volar plate.

This K-wire helps to position the Reduction Tool when reducing the volar marginal fragment (VMF).

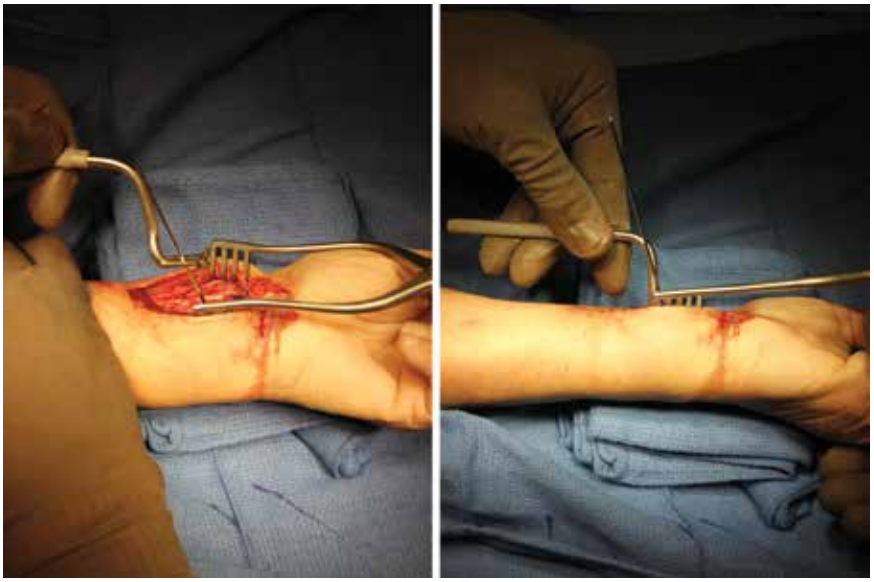
K-wire, 1.5mm

2 REDUCING THE VMF

Slide the slot of the Reduction Tool over the K-wire.

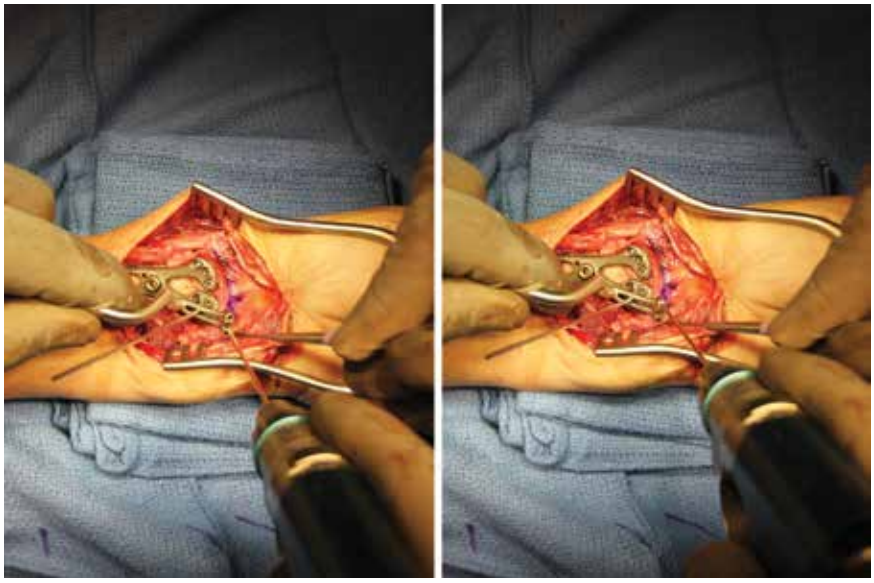
Use the hooked tip of the Reduction Tool to reduce the VMF to the plate.

NOTE:
When properly positioned, the base of the Reduction Tool should be flush to the plate with the handle parallel to the radial shaft.



Hook Plate Reduction Tool

PILOT HOLE PREPARATION 3



While maintaining the reduction, drill a 1.5mm K-wire through both holes of the Reduction Tool.

Leave the K-wire in place within the second drilled hole.

CONFIRM REDUCTION 4

Using fluoroscopy, confirm the reduction, and proper placement of the K-wire 1-2mm proximal to the subchondral plate.

NOTE:
To avoid contact with flexor tendons, the HPE must be applied proximal to and below the watershed line.

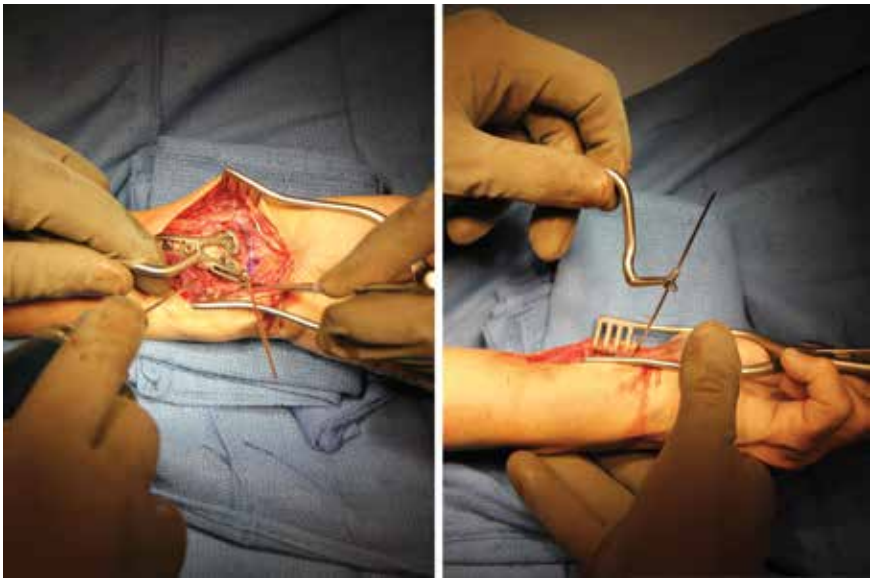
5 REDUCTION TOOL REMOVAL

Remove the K-wire from the central Hook Plate Extension screw hole on the plate.

While maintaining the position of the reduced VMF, remove the Reduction Tool by sliding it off of the K-wire.

NOTE:
Take care not to remove the K-wire to prevent VMF displacement.

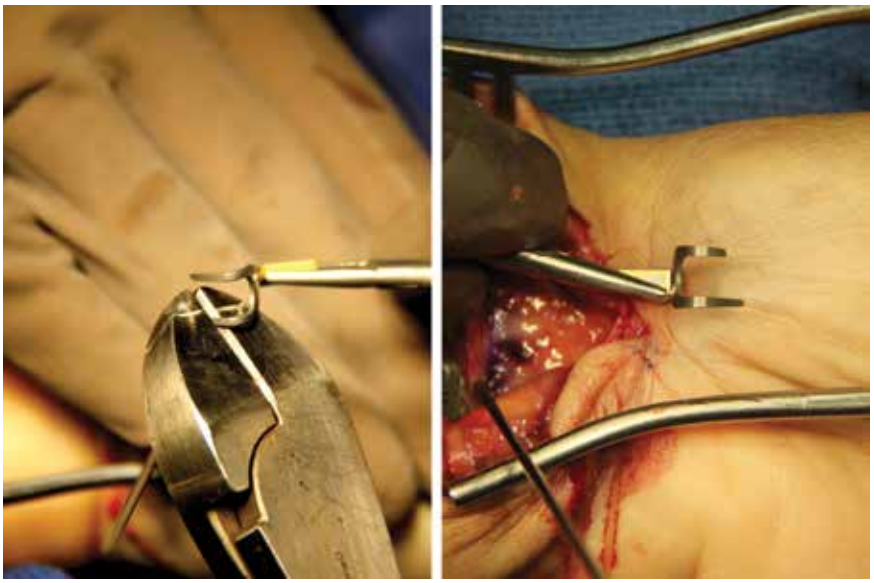
You can mark the pre-drilled hole to ease visualization.



6 HPE PREPARATION

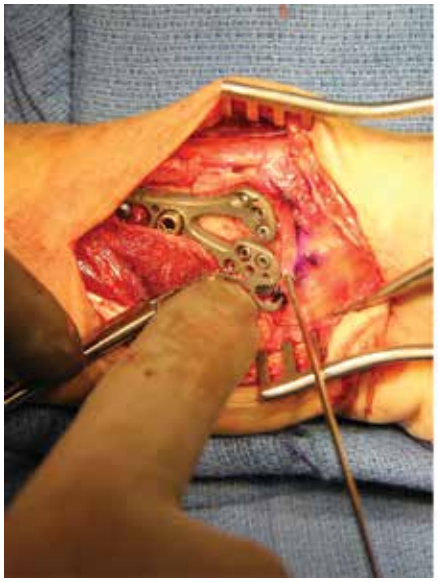
Using a pin cutter, trim the distal half of the HPE leg that corresponds to the remaining K-wire.

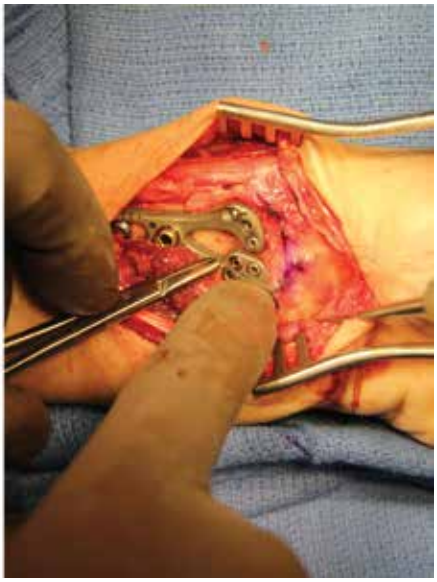
NOTE:
Cut the leg at an angle to facilitate insertion (pin cutter not included).



Hook Plate

HPE INSERTION 7



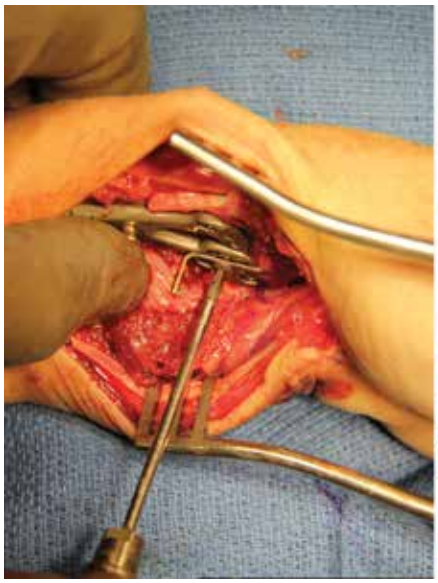


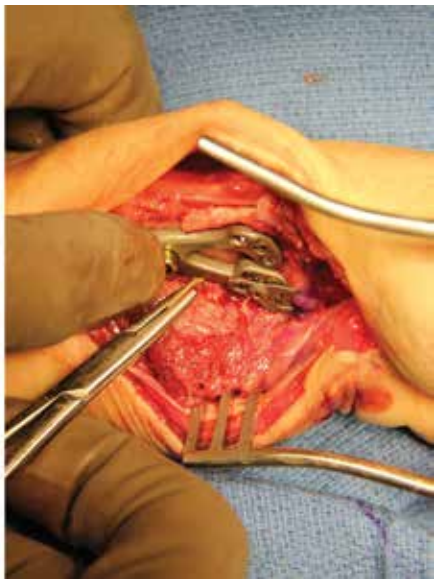
Use a needle holder to grip the HPE by the breakaway handling tab.

Insert the long leg into the first pre-drilled hole of the VMF.

Remove the remaining K-wire, then insert the short leg into the now vacant hole.

LOCKING THE HPE 8





Lock the HPE to the GEMINUS plate using the Square Tip Driver and an HPE Screw.

Remove the breakaway handling tab by lowering it toward the radius and separating it from the HPE.

NOTE:
Confirm that the HPE Screw is fully secured to the GEMINUS plate.

HPE Screw

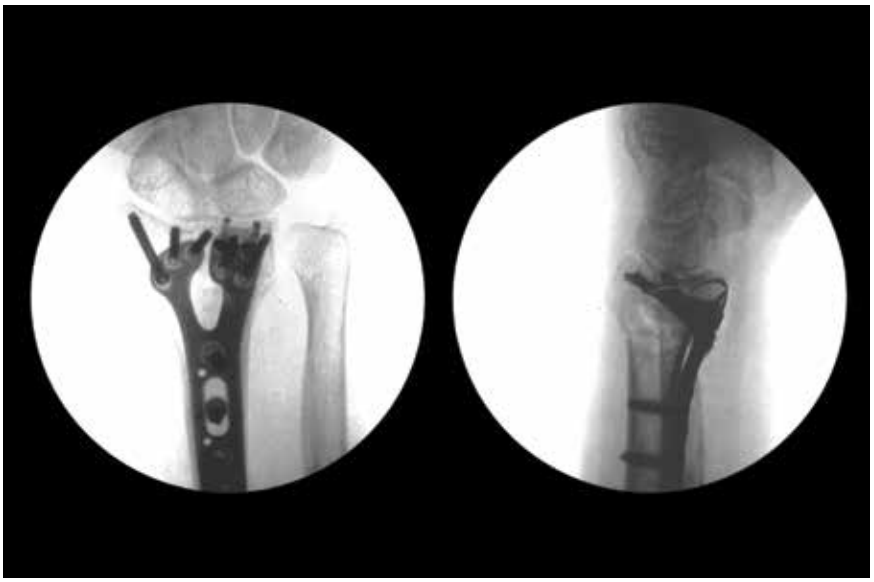
Driver, Square Tip, 2.0mm

9 FINAL FLUOROSCOPIC CONFIRMATION

Confirm proper placement of the HPE using fluoroscopy.

It should capture the VMF with its legs positioned just beneath the subchondral bone.

Refer to page 17, steps 28-32 for soft tissue repairs and wound closure.



DISTAL FRAGMENT FIRST
For Extra-articular Fractures and Osteotomies

1 ESTABLISHING VOLAR TILT

Insert the blunt end of a .062 K-wire through the wrist capsule at the level of the interfossa sulcus.

Confirm proper placement parallel to the joint using a 20^0-30^0 elevated lateral flouroscopic view.

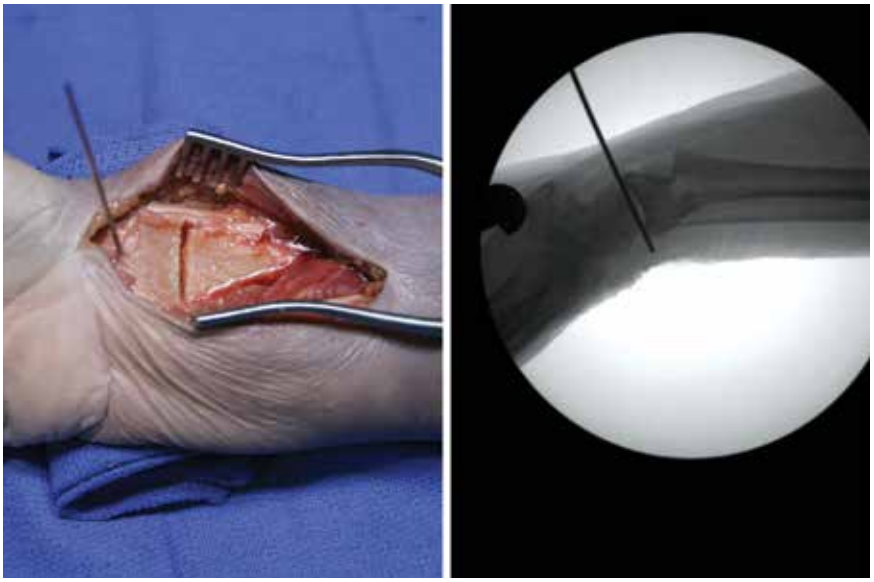


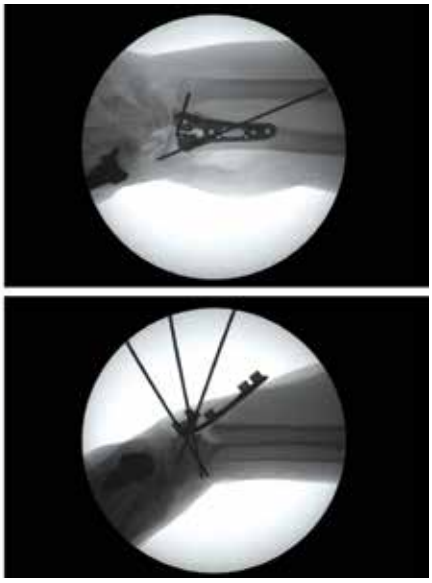
PLATE POSITIONING 2

Place the plate approximately 2mm proximal and parallel to the watershed line, centered on the distal fragment. This will correct the coronal plane deformity.

Elevate the shaft of the plate with respect to the distal fragment to the estimated volar tilt.

Insert the alignment K-wire through the distal hole of the plate. Confirm it is positioned parallel to the joint, and that proper volar tilt has been achieved.

PROVISIONAL DISTAL FIXATION 3



Insert a K-wire into the A.I.M.ing guides through the most ulnar and radial holes.

Confirm proper placement of the K-wires referencing page 12, steps 17-18.

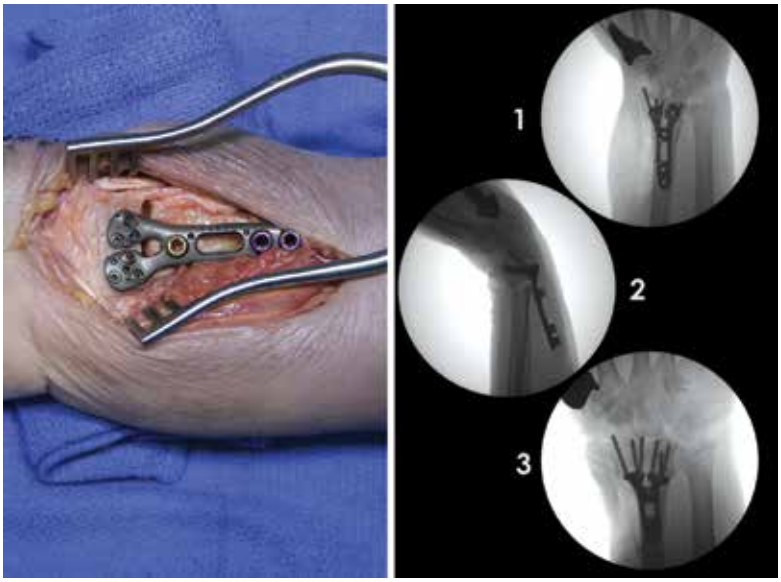
After the GEMINUS plate has been fixed to the distal fragment, remove the distal most K-wire used to reference the joint line.

4 FINAL DISTAL FIXATION

Secure the GEMINUS plate to the distal fragment as previously described on page 13, in the main section of this surgical technique guide.

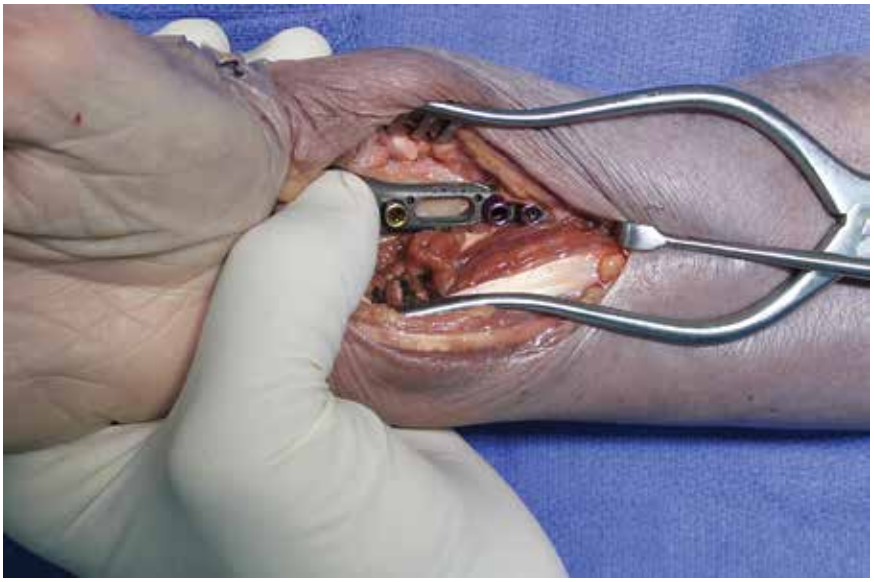
Confirm reduction and proper peg placement in the AP view (1), a 20˚ elevated lateral fluoroscopic view (2) and by rotating the wrist under fluoroscopy using a tangential view (3).

WARNING:
Remove ALL PDG's and A.I.M.ing Guides



5 RESTORING VOLAR TILT

Lower the shaft of the GEMINUS plate to the radial shaft to reduce the fracture.



PROXIMAL PLATE FIXATION 6

Secure the shaft of the GEMINUS plate to the radial shaft as previously described in steps 15 and 24 in the main section of this surgical technique guide.

FLUOROSCOPIC CONFIRMATION 7

Confirm that proper radial length, inclination and volar tilt have been achieved using fluoroscopy.

Close the wound as described starting on page 17, steps 28-32 of the main section of this surgical technique guide.

Optional Drill Block Usage

1 DRILL BLOCK SELECTION

There are six reusable GEMINUS Drill Blocks that are size and side specific to each of the GEMINUS plates with gold PDG's in the shaft.

Note:
The Drill Blocks are not compatible with plates having more that 4 holes in the shaft.

Drill Blocks may not be used if the plate has been contoured.

On the narrow Drill Block, the proximal radial hole on the lunate side accepts the 2.0mm drill directly and the drill guide is not needed.

2 DISTAL PDG REMOVAL

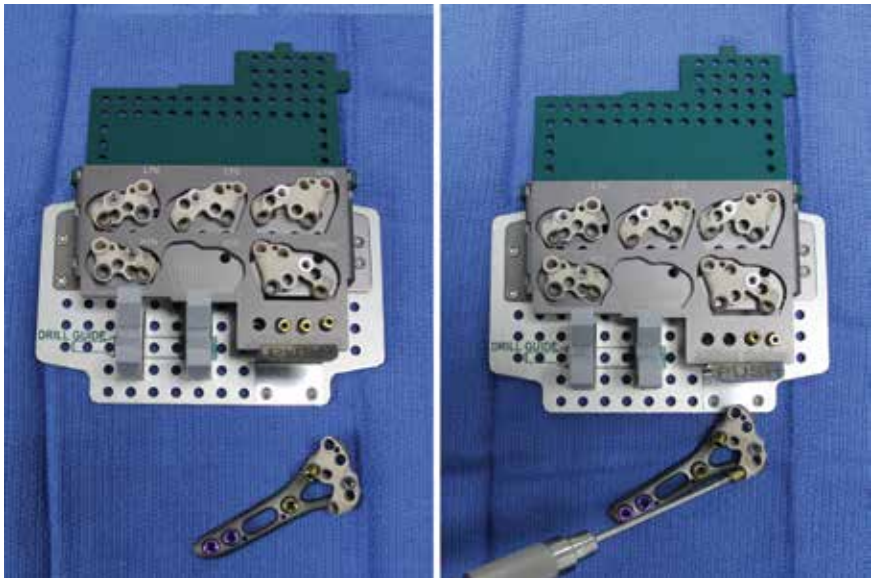
Using the Peg Driver, remove all of the PDG's from both heads of the plate.

Select the appropriate Drill Block for the plate being used.

Align the Drill Block flush to the head of the plate, then secure it by tightening the captive drill guide using the square tip driver.

Driver, Square Tip 2.0mm

PLATE POSITIONING 3

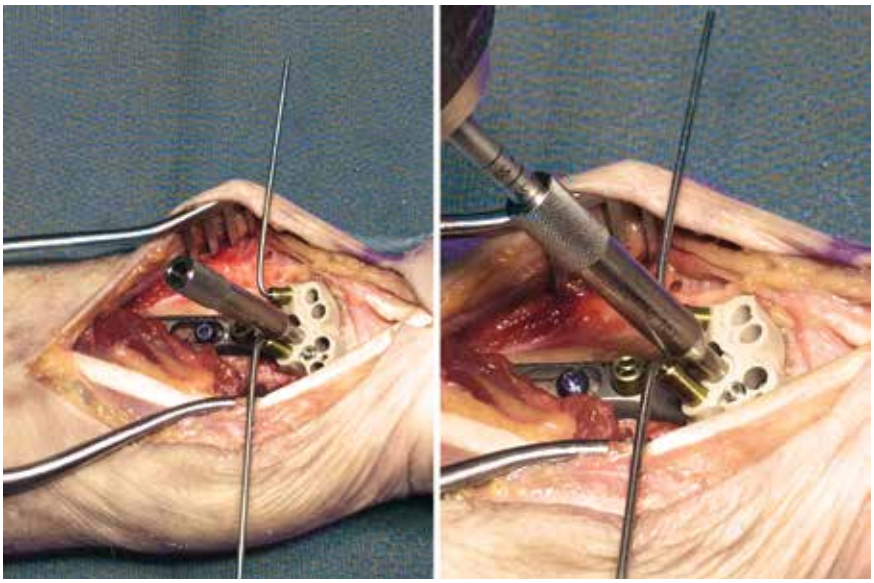


Secure an A.I.M.ing Guide into the most proximal ulnar hole of the lunate head and most radial hole on the scaphoid head.

Refer to pages 11-12, steps 15-18 in the main section of this surgical technique guide for proper plate positioning and provisional fixation.

Drill Block, A.I.M.ing Guide, 1.5mm
(Located in the Drill Block Module)

PILOT HOLE PREPARATION 4



Secure the 2.0mm Thread-in Drill Guide into the most proximal medial hole on the lunate side of the Drill Block.

Using the 2.0mm bit, drill through the Thread-in Drill guide.

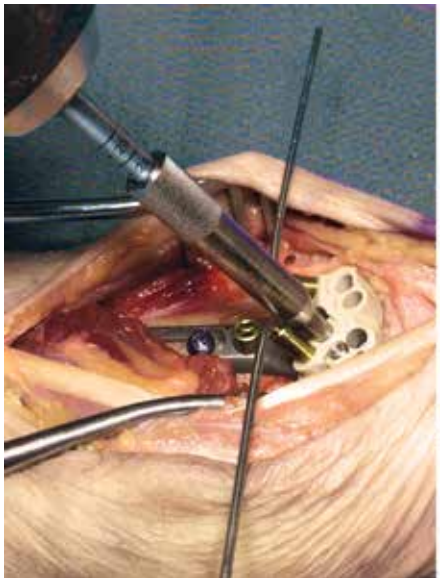
Thread-in Drill Guide, 2.3mm

5 MEASURING SCREW LENGTH

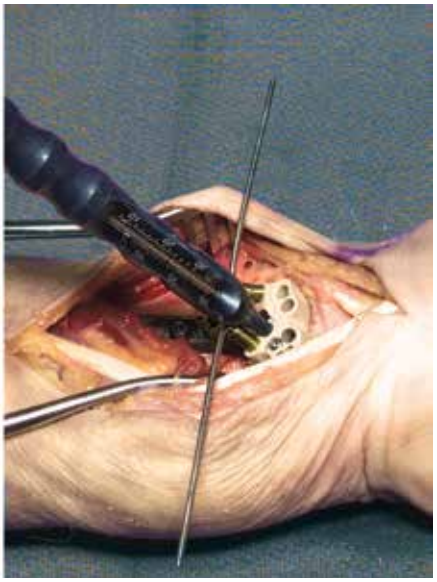
Determine the proper screw length by reading the measurement directly from the drill (1).

You can also remove the Thread-in Drill Guide and measure the screw length using the appropriate scale on the Depth Gauge (2).

NOTE:
The scale with the symbol is used with the optional Drill Blocks.



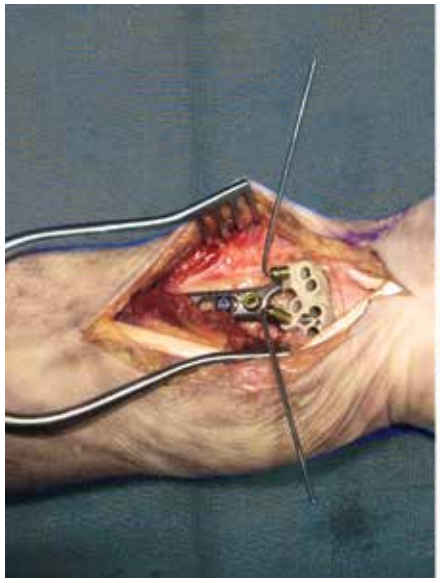
1



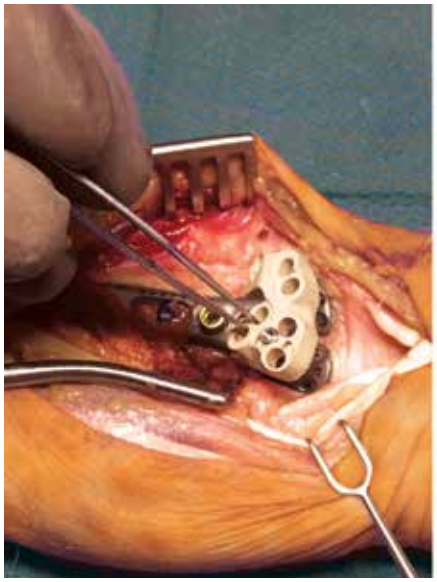
2

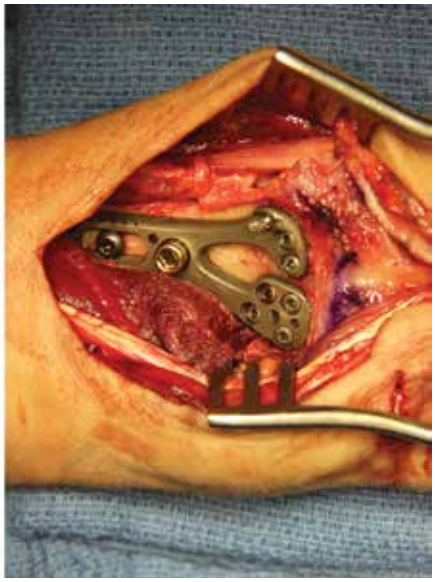
6 DISTAL FRAGMENT FIXATION

Refer to page 13 in the main section of this surgical technique for distal fragment fixation.



FINAL DISTAL FRAGMENT FIXATION 7





Using the peg driver, remove the Drill Block from the plate.

Prepare the final distal hole of the GEMINUS plate.

For proximal plate fixation and wound closure, refer to the main section of this surgical technique guide, starting on page 15, steps 24-32.

Notes

PROTEAN Fragment Plate - Surgical Technique

1 FRACTURE EXPOSURE

Expose then debride the fracture.

Reduce the fragments(s) and assess for proper plate positioning.

2 PROTEAN PLIER FEATURES

The PROTEAN plates are designed to be contoured using proprietary Bending Pliers either on the back table or in-situ after plate application.

The plates incorporate a beveled edge that allow for the Bending Pliers to securely grip the plates.

Manipulation can easily be achieved in all three planes at the level of the inter-node sections of the plates.

PROTEAN plates incorporate a unique design:

Top surface edges have a gradual radius

Bottom surface edges have a chamfer

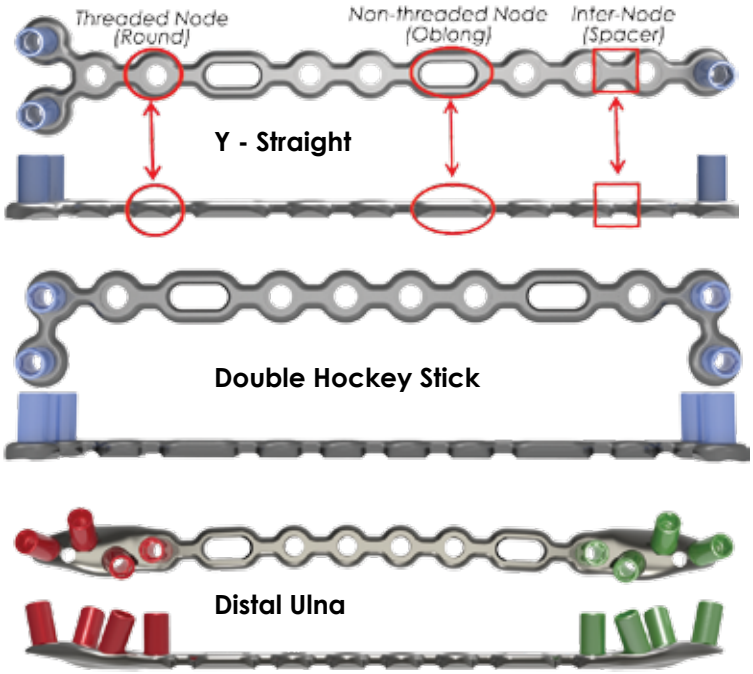
Cutouts are designed to interface with plate geometries.

PROTEAN plate benders feature a unique jaw design:

Adapts to plates w/ PDG's

Adapts to plates w/ Thread-In Drill Guides

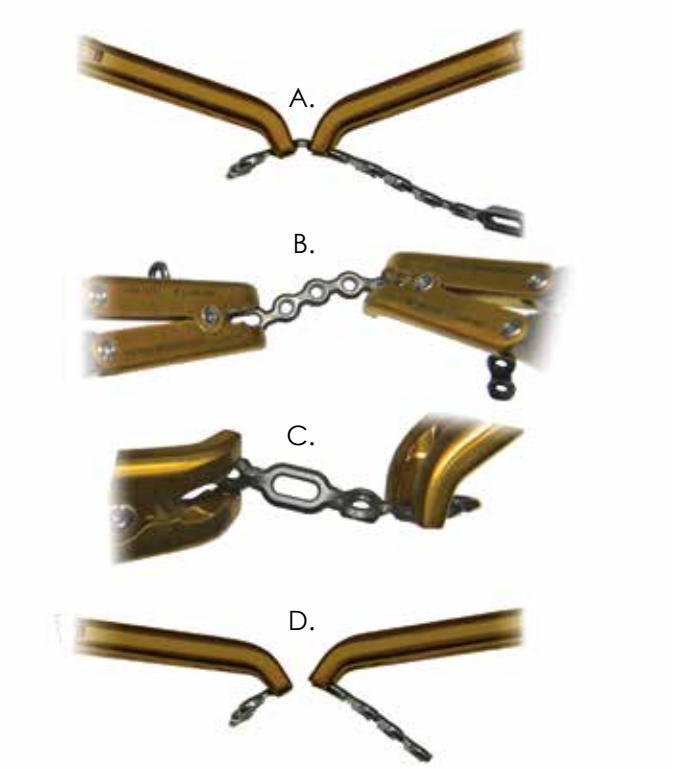
PROTEAN PLATE FEATURES 3



PROTEAN Plates:

- Are malleable in three planes
- Accept PDG's or Thread-in Drill Guides
- Accept all screw options

PLATE MANIPULATION 4



To properly contour or cut a plate, securely grip the plate at any two nodes (round or oblong) using the Bending Pliers and shape the plate as intended.

A. Vertical Plane: Secure the pliers to any two nodes for bending up to 30^0.

B. Horizontal Plane: Secure the pliers to any two nodes for bending up to 5^0.

C. Transverse Plane: Secure the pliers to any two nodes for bending up to 45^0.

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

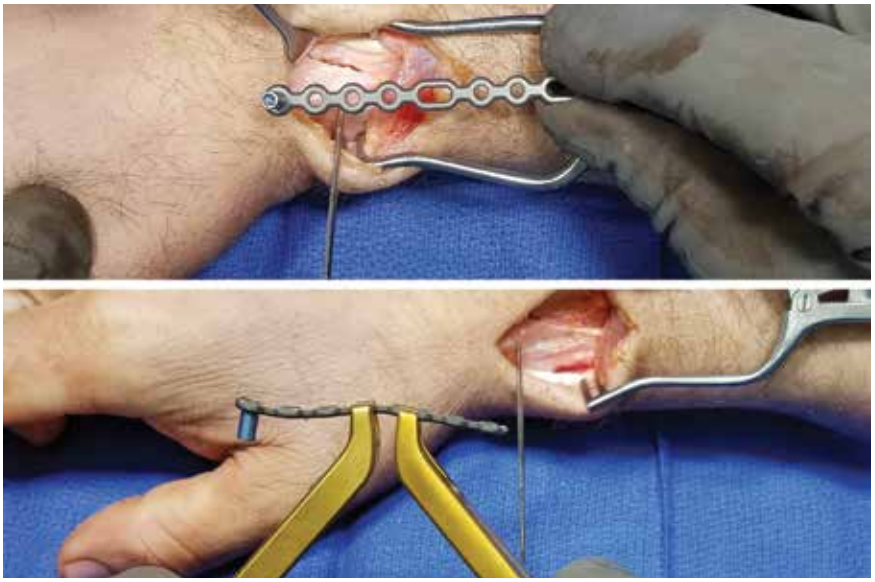
D. Cutting to length: Bend in continuous motion (undersurface to undersurface) past 120^0.

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

5 PROVISIONAL PLATE SIZING

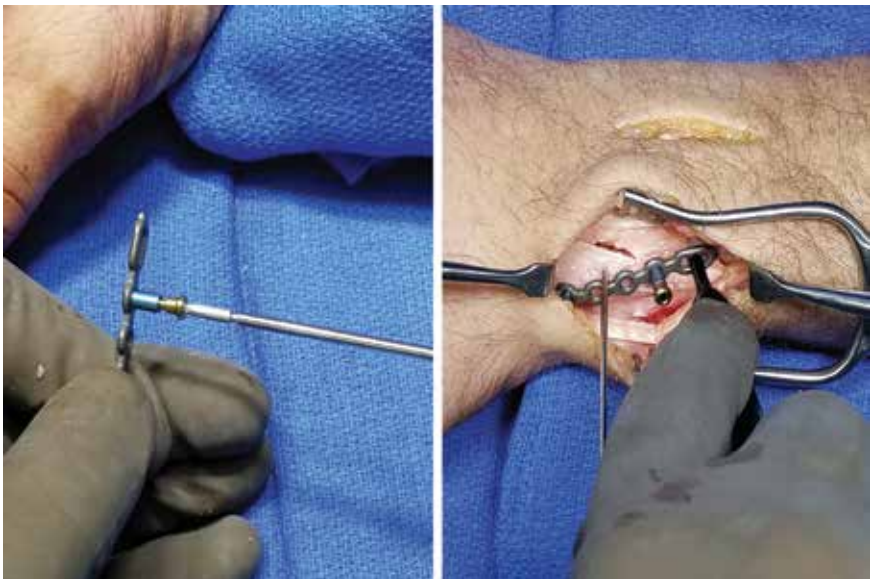
Position the plate to span the fracture site, then measure and cut to the proper length.

Now provisionally contour the plate to match the anatomy using the Bending Pliers.

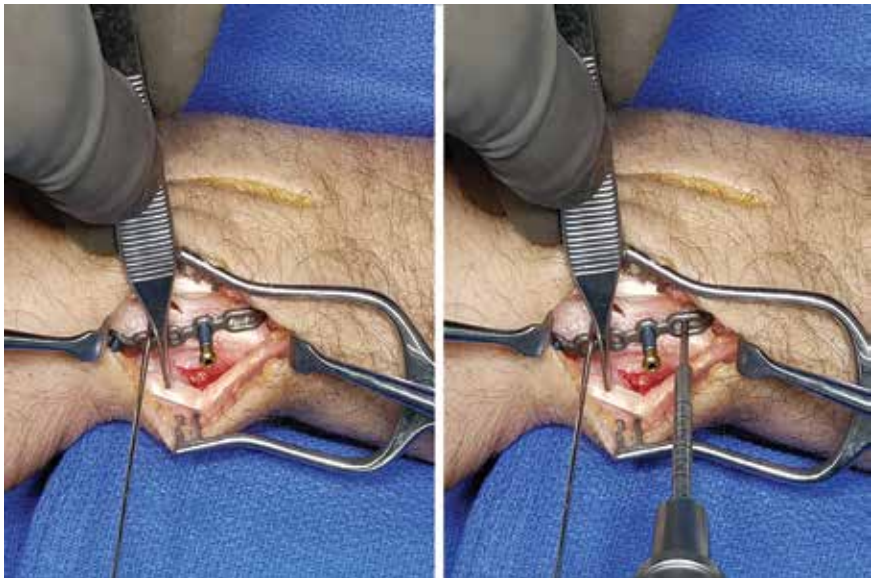


6 LOADING A.I.M.ING GUIDES

Using the Peg Driver, secure A.I.M.ing Guides to the PDG, then use K-wires to stabilize the fragments.



PROVISIONAL PLATE FIXATION 7

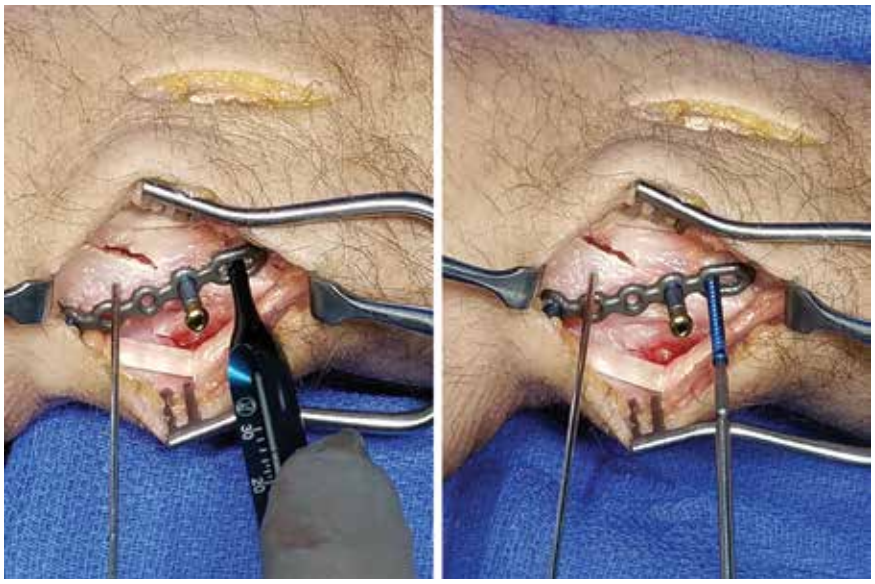


Position the Plate to span the fracture line.

Using the 2.0mm bit, drill through an oblong node of the plate.

Drill, 2.0mm x 40mm

SECURING THE PLATE 8



Measure the screw length using the Depth Gauge.

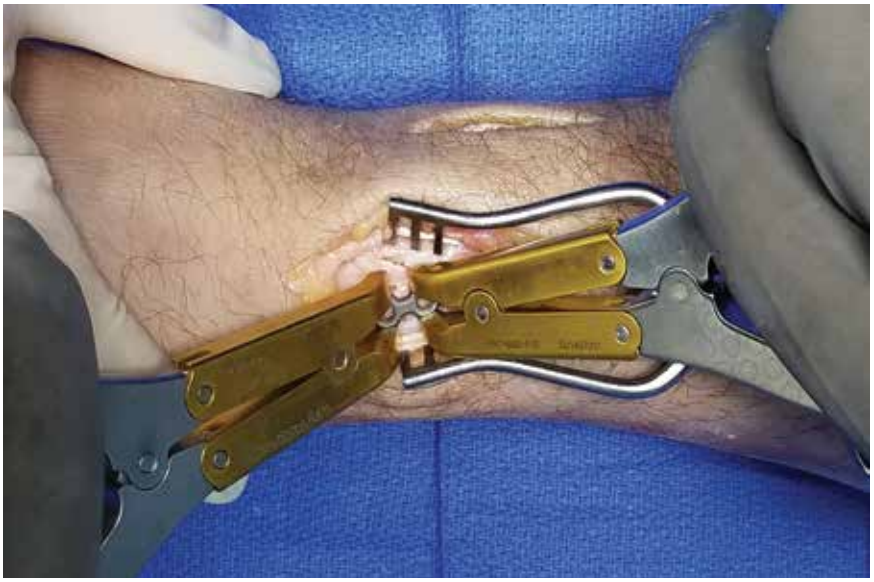
Now insert a 2.7mm fully Threaded Peg (non locking).

Threaded Peg, Non Locking

9 IN-SITU PLATE CONTOURING

Adjust the plate's position, then contour the plate as needed to match the anatomy using the Bending Pliers.

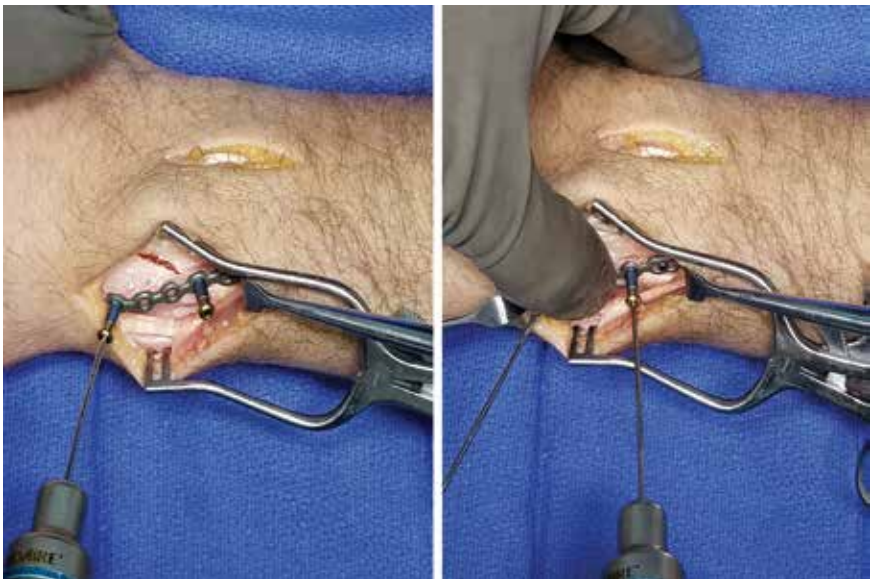
NOTE:
Be sure to securely hold the plate at the nodes with the Bending Pliers



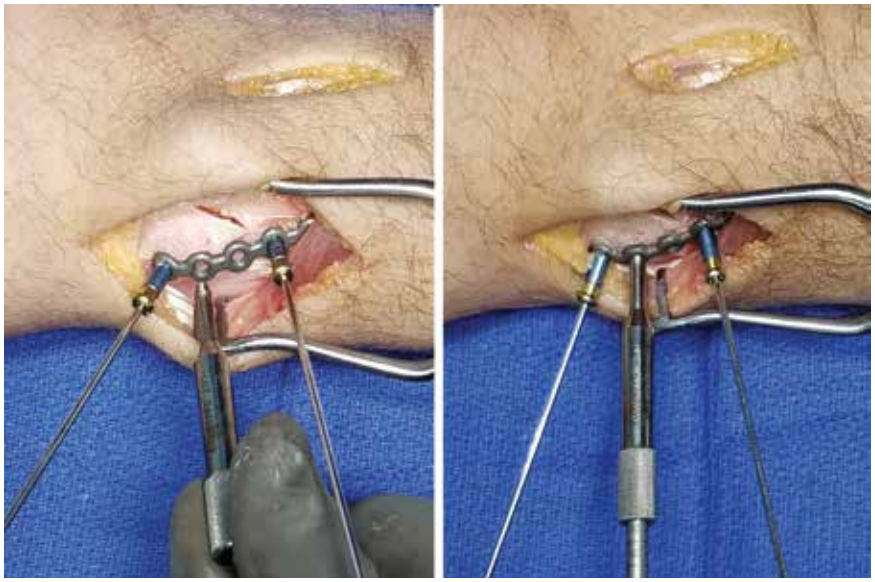
10 FINAL FRACTURE REDUCTION

Secure the plate to the fragment(s) using a 1.5mm K-wire through the A.I.M.ing Guides.

NOTE:
Confirm proper placement using fluoroscopy.



DRILLING THROUGH THREAD-IN DRILL GUIDE 11



If drilling a fixed angle screw through a node that does not have a PDG, secure the 2.0mm Thread-In Drill Guide to the round node.

Drill through the guide using the 2.0mm bit, then measure the screw length directly from the marked drill bit.

Thread-In Drill Guide, 2.0mm

SCREW INSERTION 12

Remove the Thread-In Drill Guide.

Now insert the appropriate length 2.3mm threaded screw (locking) or a 2.7mm High Compression screw.

Repeat the previous steps for the remaining screw holes.

Threaded Peg, Locking

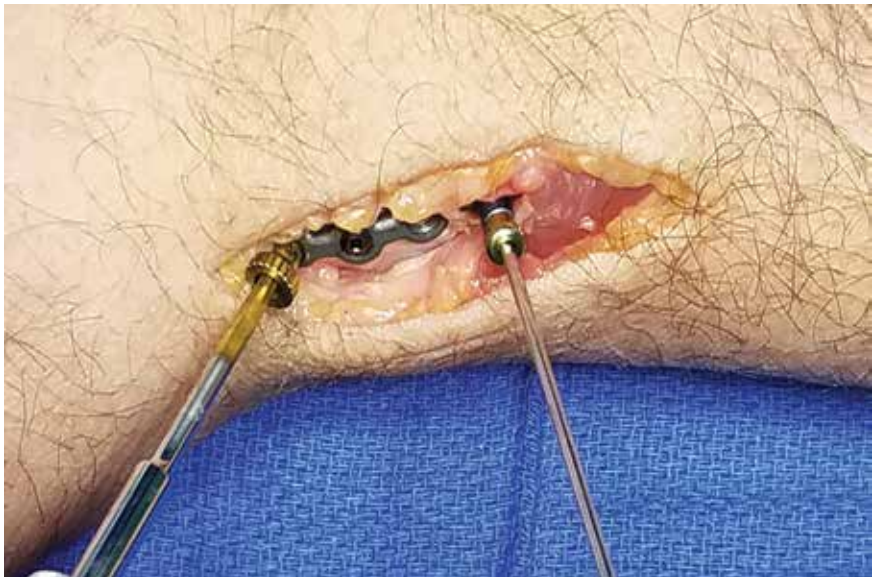
High Compression Locking Peg

13 POLYAXIAL SCREW FIXATION

If present, remove the A.I.M.ing and PDG using the Peg Driver.

Insert the PLS A.I.M.ing Guide into the desired node using the PLS Initial Driver.

NOTE:
The maximum angulation of the PLS should not exceed 10˚ from the trajectory of the respective fixed angle hole.



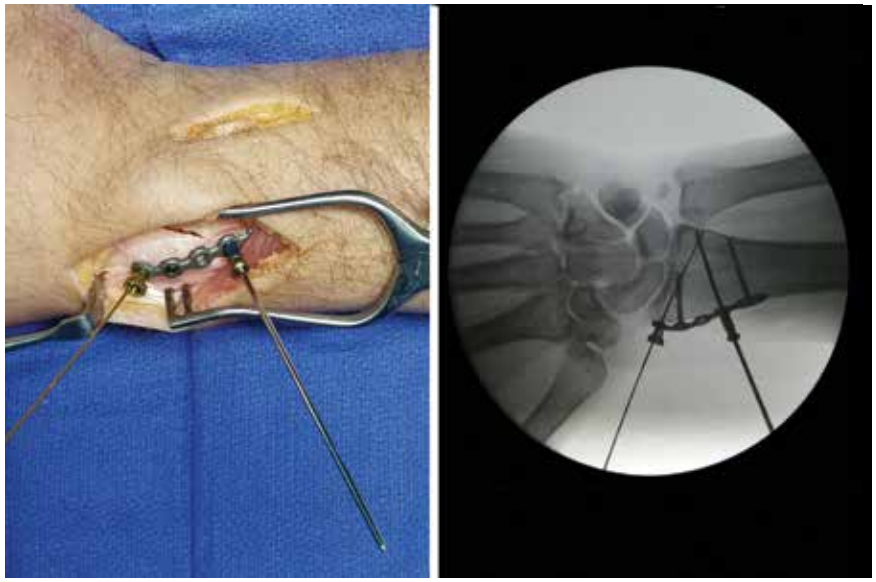
Initial Driver, PLS

PLS A.I.M.ing Guide

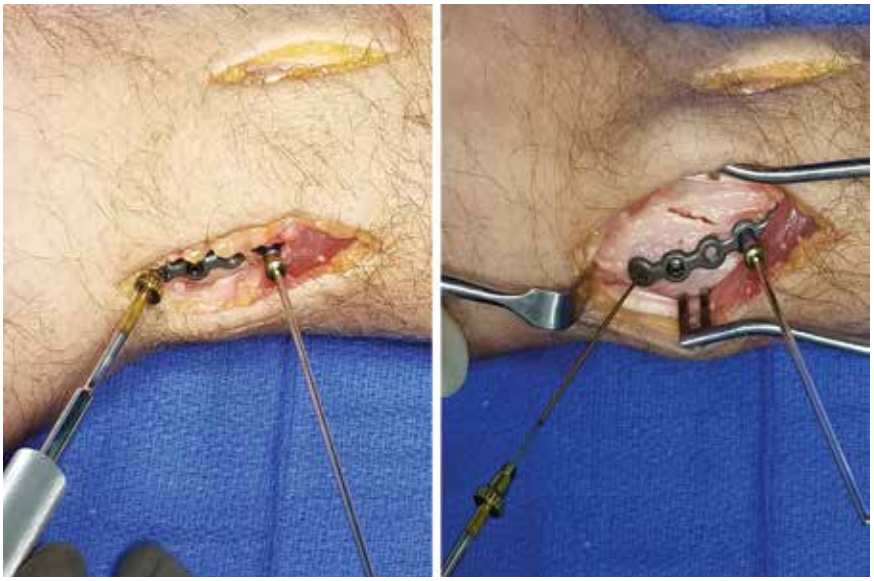
14 PLS K-WIRE INSERTION

Insert the gold end of the .9mm K-wire through the PLS A.I.M.ing Guide in the desired trajectory until the far cortex is reached.

Confirm that the desired trajectory has been achieved using fluoroscopy.



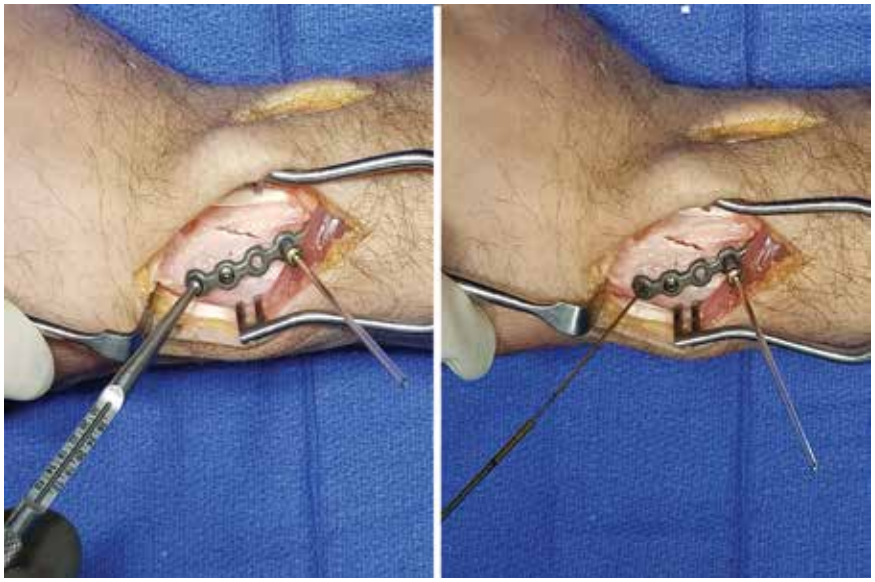
PLS A.I.M.ing GUIDE REMOVAL 15



Slide the PLS Initial Driver over the K-wire to engage and remove the PLS A.I.M.ing Guide.

NOTE:
Be sure to leave the .9mm K-wire in place.

PLS SCREW PREPARATION 16



Slide the cannulated PLS Depth Gauge over the K-wire until flush against the plate and measure the screw length.

Remove the depth gauge leaving the K-wire in place. Then drill over the K-wire using the 2.0mm Cannulated Drill up to the far cortex.

17 PLS SCREW INSERTION

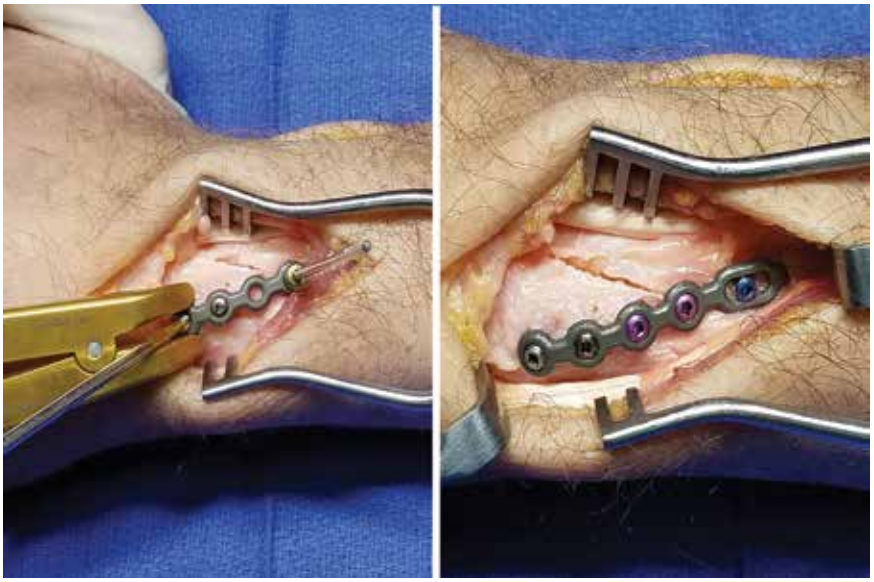
Using the PLS Initial Driver, insert the PLS over the K-wire and into the desired trajectory until the head of the PLS engages the plate.

Remove the K-wire and the PLS Initial Driver.

18 USING THE PLS INITIAL DRIVER, INSERT THE PLS

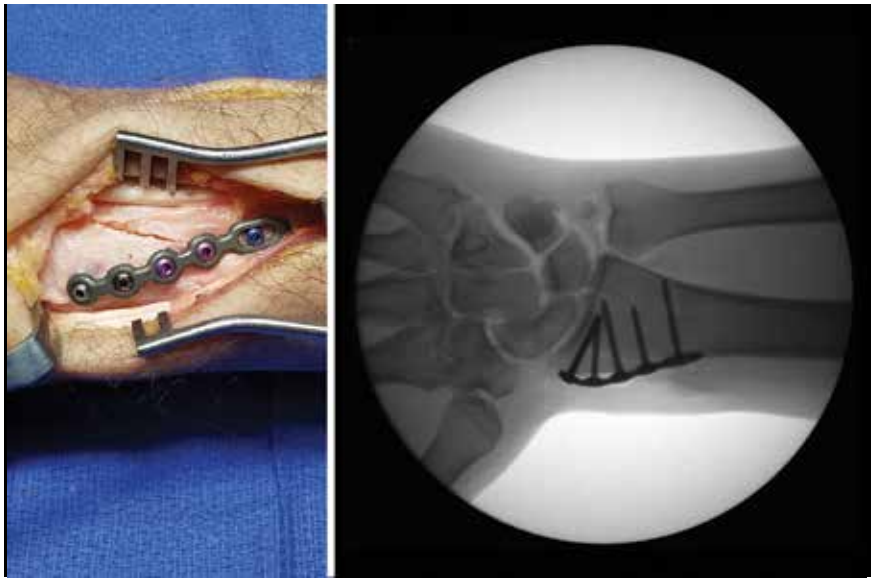
Securely hold the respective node using the Bending Pliers.

Use the stronger PLS Final Driver to fully engage the screw.



Final Driver, PLS

FLUOROSCOPIC CONFIRMATION 19



Confirm the reduction, proper screw placement and screw length using fluoroscopy.

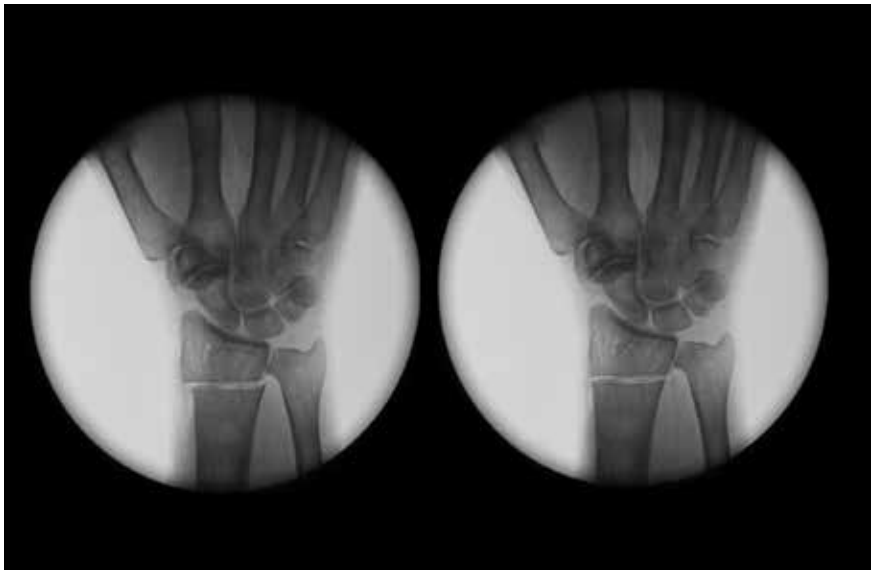
Confirm that all screws have been fully tightened.

Repair soft tissues as needed, then close the incision in your normal fashion.

NOTE:
Confirm that all PDG's have been removed even if the respective node has not been used.

Dorsal Spanning Plate - Surgical Steps

FRACTURE REDUCTION 1



Apply traction to reduce the fracture.

Achieving adequate reduction may require additional manipulation.

Confirm fracture reduction using fluoroscopy.

NOTE:
Finger trap traction may be helpful in maintaining the reduction.

2 ATTACHING INSERTION HANDLE

The Dorsal Spanning Plates are offered in two lengths: short and long. They are also anatomically designed with a metacarpal and radial end.

Select the appropriate length Dorsal Spanning Plate and attach the Insertion Handle to the most proximal hole at the metacarpal end.

Using the T-10 driver, confirm that the Insertion Handle locking screw is fully tightened.

3 PLATE POSITIONING

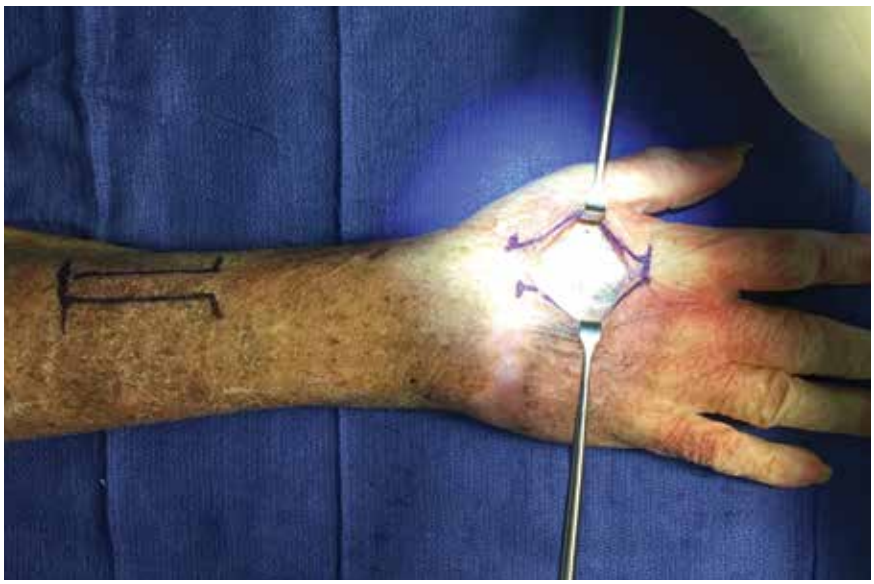
Correctly orient the plate on the skin over the 2nd or 3rd metacarpal and the radius.

Verify the plate positioning using fluoroscopy, then mark the distal and proximal end points.

Short

Long

DISTAL EXPOSURE 4

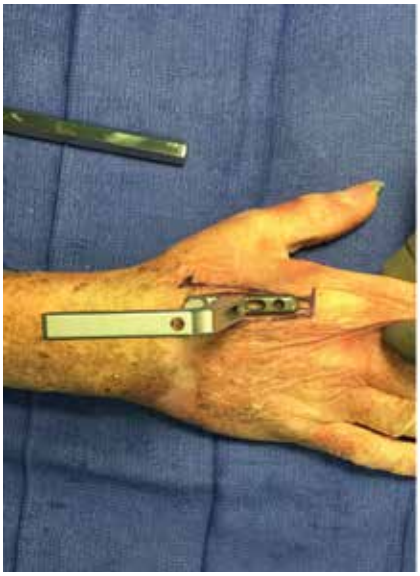


Make a 3cm incision centered over the metacarpal.

NOTE:
If placed on the 2nd metacarpal, ensure that the plate is inserted under the EPL and through the 2nd extensor compartment.

If placed on the 3rd metacarpal, release and mobilize the third and fourth compartments to allow the plate to pass beneath the tendons.

PLATE INSERTION 5



Insert the plate retrograde through the distal incision along the dorsal surface of the radius.

Verify the extensor tendons remain superficial to the plate.

Verify the plate positioning and confirm fracture reduction using fluoroscopy.

6 PROXIMAL EXPOSURE

Make a 4cm incision at the level of the previously marked location to expose the radial shaft.

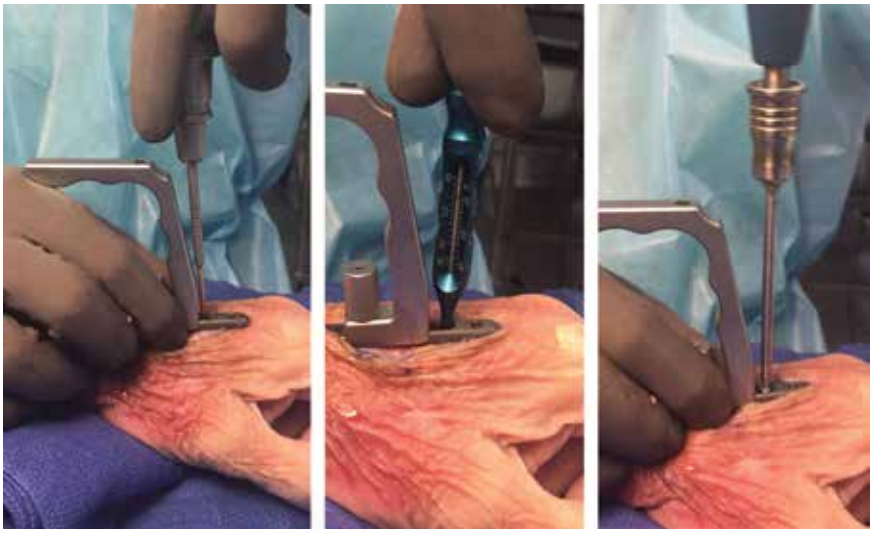
Be sure to identify and protect the radial sensory nerve.

7 PROVISIONAL DISTAL FIXATION

Drill through the gliding hole on the metacarpal end of the plate using the 2.3mm bit.

Measure the screw length directly through the plate using the Depth Gauge taking note of the scale with the symbol  .

Insert and fully tighten a 3.0mm Compression Screw using the T-10 driver.

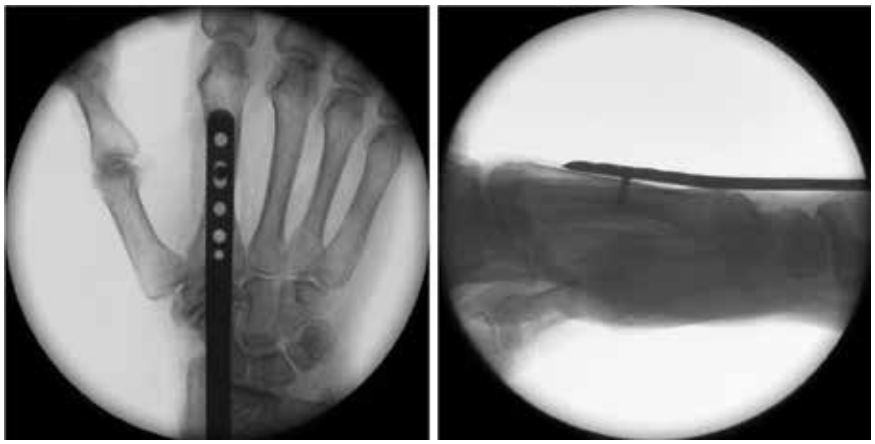


Drill, 2.3mm

Depth Gauge, Standard

Compression Screw

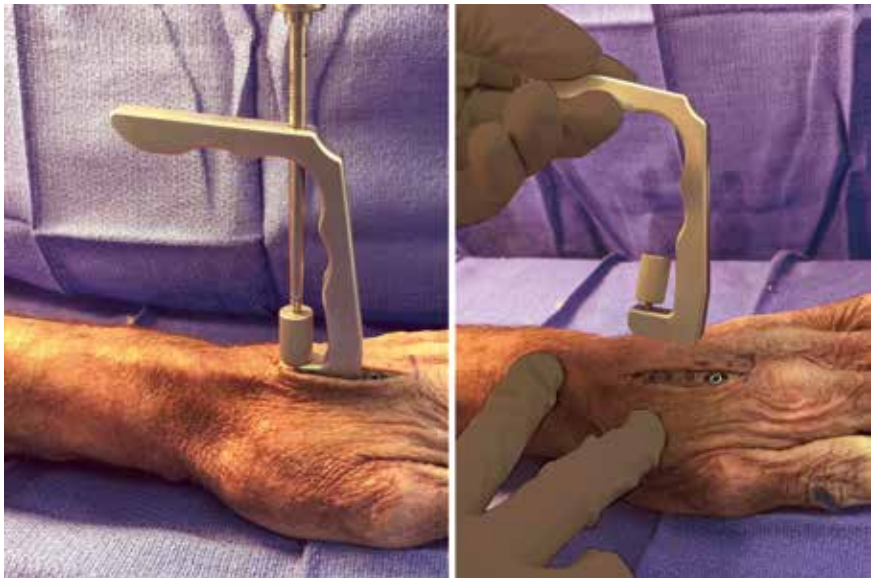
FLUOROSCOPIC CONFIRMATION 8



Confirm proper screw placement and length using fluoroscopy.

Caution:
Prevent excessive screw length as this can potentially cause soft tissue irritation.

INSERTION HANDLE REMOVAL 9

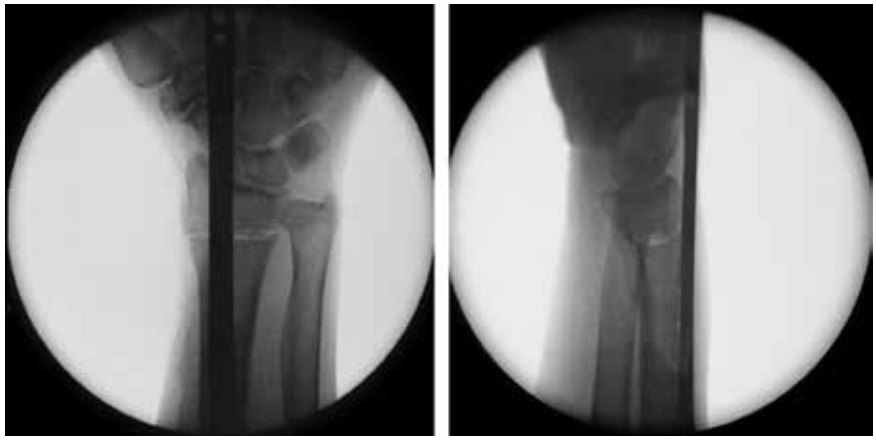


Using the T-10 driver, loosen the Lock Screw and remove the Insertion Handle.

10 FRACTURE REDUCTION

Adjust traction as needed to achieve fracture reduction.

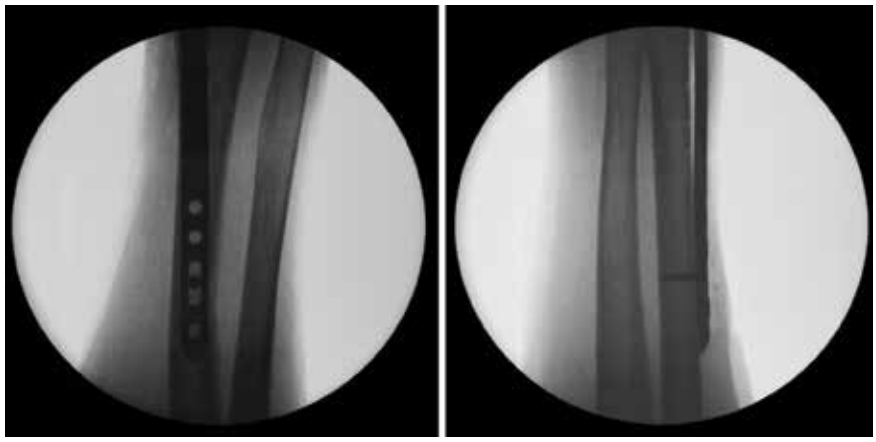
Confirm that radial length and a proper reduction have been achieved using fluoroscopy.



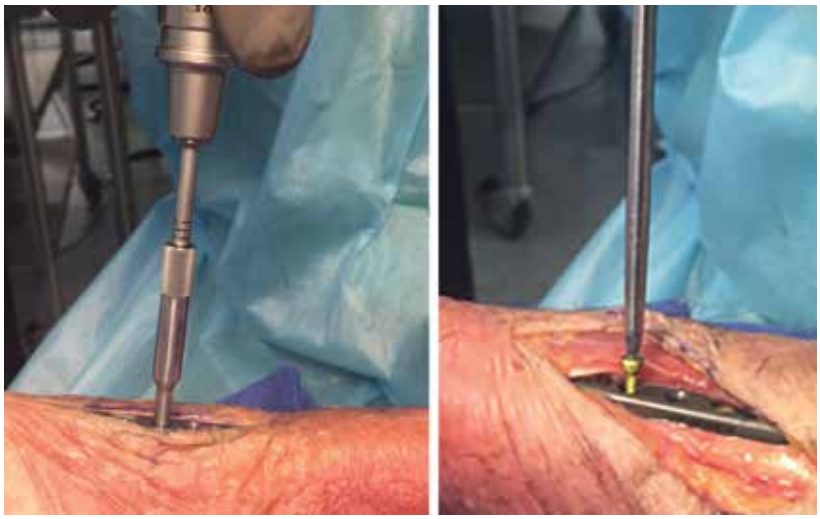
11 PROVISIONAL PROXIMAL FIXATION

Drill, measure and insert a 3.0mm Compression Screw into the gliding hole on the radial end of the plate.

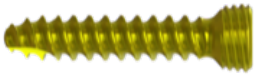
Confirm proper screw placement and length using fluoroscopy.



FINAL PLATE FIXATION 12



Thread-in Drill Guide, 2.3mm



Screw, Multi-Thread, Locking, 3.0mm

Secure the 2.3mm Thread-In Drill Guide into a threaded hole of the plate.

Drill through the Thread-In Drill Guide, then measure the screw length using the etched marks on the side of the bit.

Remove the Thread-In Drill Guide, then insert and fully tighten either a 3.0mm Compression or Locking Screw using the T-10 driver.

Repeat this step for the remaining holes at both ends of the plate.

FINAL CONFIRMATION & WOUND CLOSURE 13

Confirm proper reduction, screw length and placement using fluoroscopy.

Close the incisions in your normal fashion.

After the fracture has healed, the plate is removed through the distal incision.

Optional Plate Bending Technique

1 PLATE SETUP

The GEMINUS system includes a pair of Plate Benders used to manipulate each head of the GEMINUS plate independently.

The Plate Holder is designed to secure the shaft of the GEMINUS plate during manipulation. The plate holder has openings at each end that are size specific to the length of the plate's shaft.

The plate bender has three slots to manipulate the head of each plate size and configuration (with or without PDG's).

Note:
The head should fit snug within the selected slot.

2 ADJUSTING VOLAR TILT

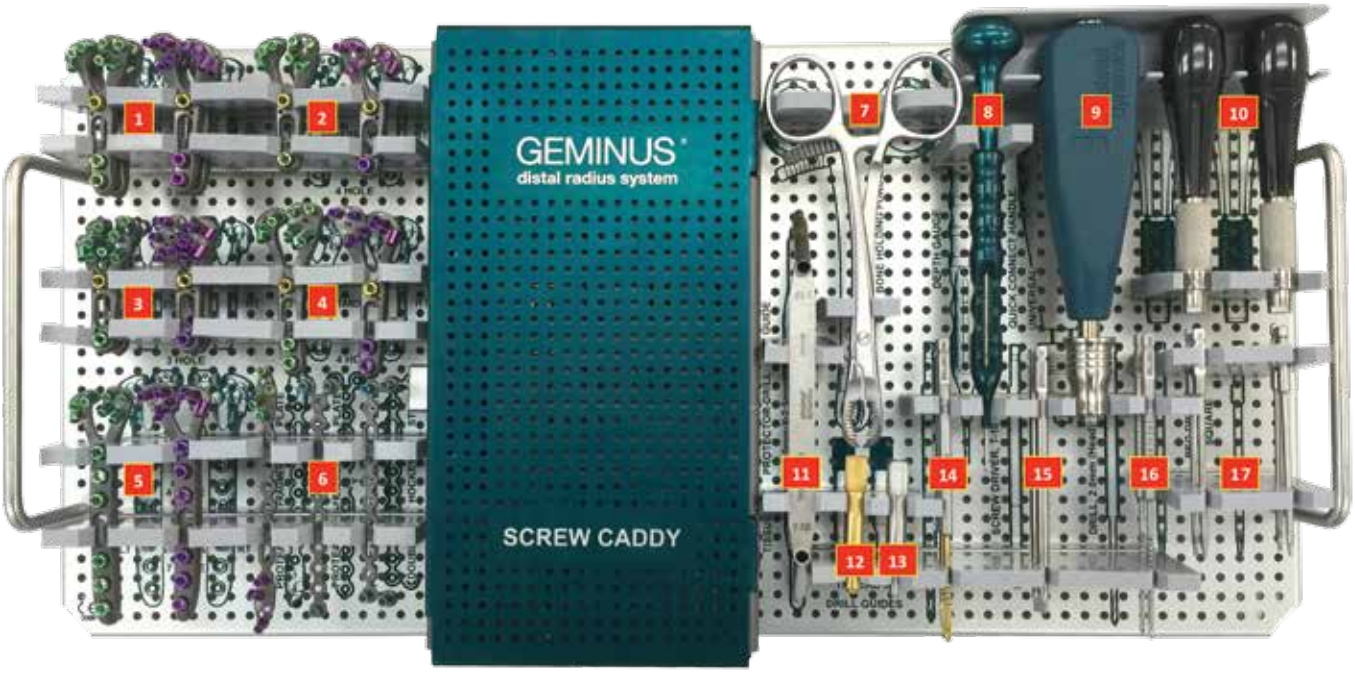
With the shaft of the plate secured into the Plate Holder, use the Plate Bender to manipulate the plate to achieve the desired angle.

Note:
When bending the plate, make small adjustments until the desired angle is achieved.

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

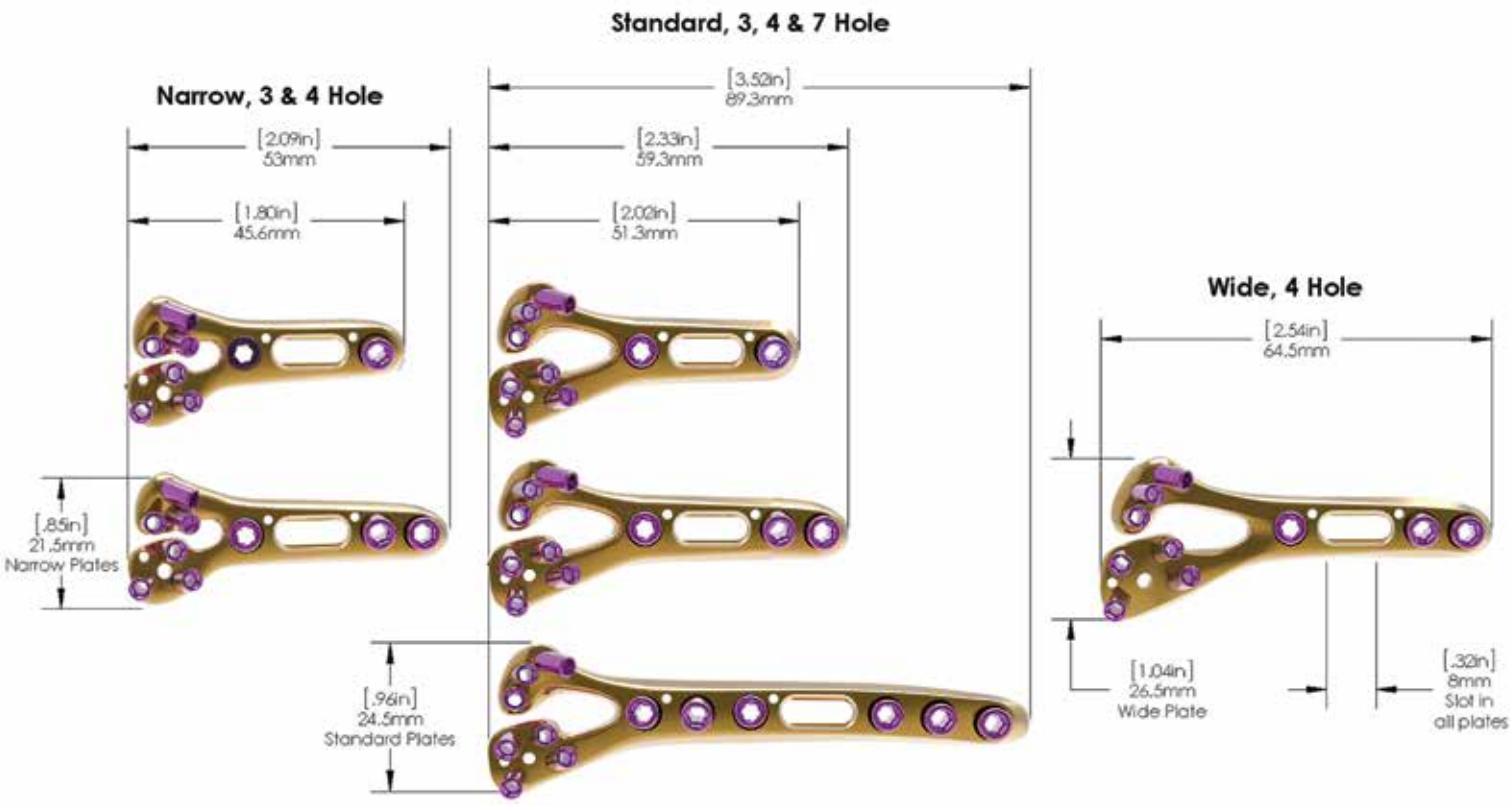
GEMINUS® Volar Distal Radius Plating System - Cat.# GMN-FSP-SYS

INSTRUMENTATION TRAY

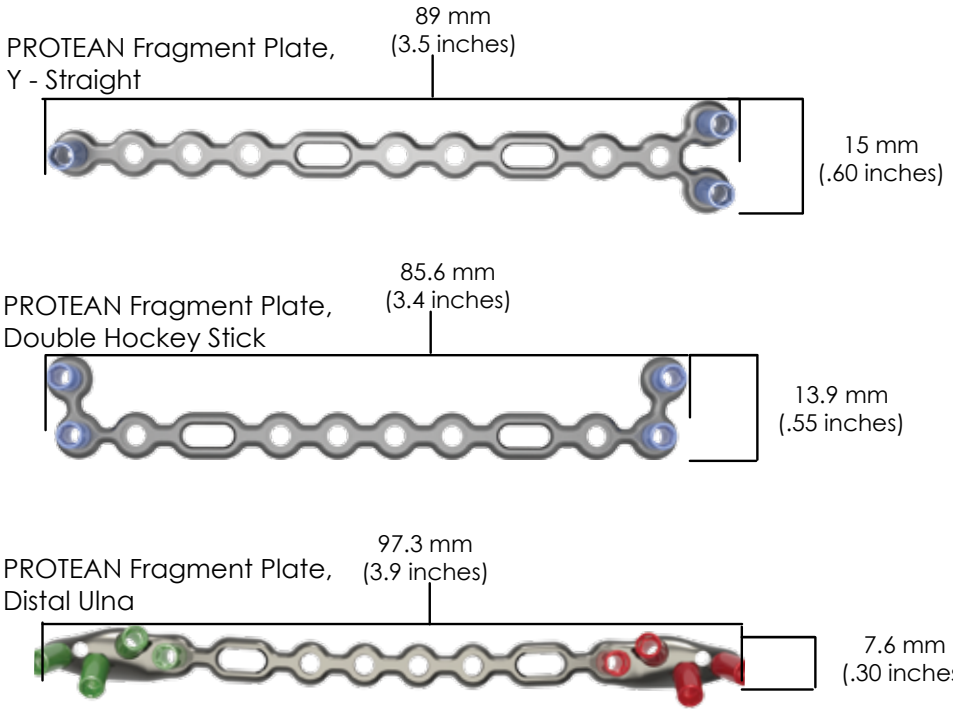


Loc #	Catalog #	Description
1	GMN-LTS-4HL	GEMINUS Plate, Standard, 4 Hole, Left
	GMN-RTS-4HL	GEMINUS Plate, Standard, 4 Hole, Right
2	GMN-LTS-3HL	GEMINUS Plate, Standard, 3 Hole, Left
	GMN-RTS-3HL	GEMINUS Plate, Standard, 3 Hole, Right
3	GMN-LTN-3HL	GEMINUS Plate, Narrow, 3 Hole, Left
	GMN-RTN-3HL	GEMINUS Plate, Narrow, 3 Hole, Right
	GMN-LTN-4HL	GEMINUS Plate, Narrow, 4 Hole, Left
	GMN-RTN-4HL	GEMINUS Plate, Narrow, 4 Hole, Right
4	GMN-LTW-4HL	GEMINUS Plate, Wide, 4 Hole, Left
	GMN-RTW-4HL	GEMINUS Plate, Wide, 4 Hole, Right
5	GMN-LTS-7HL	GEMINUS Plate, Standard, 7 Hole, Left
	GMN-RTS-7HL	GEMINUS Plate, Standard, 7 Hole, Right
6	PRT-FSP-DU	PROTEAN Fragment Plate, Distal Ulna
	PRT-FSP-YS	PROTEAN Fragment Plate, Y- Straight
	PRT-FSP-LR	PROTEAN Fragment Plate, Double Hockey Stick
7	FRCP-BHM-RTC	Forceps, Bone Holding
8	DPGA-SMS-030	Depth Gauge, Standard
9	HNDL-UQC-FXD	Handle, Universal Quick Connect
10	HNDL-SQC-FXD	Handle, Small Quick Connect
11	TPDG-DSD-2025	Tissue Protector / Drill Guide, 2.0mm x 2.5mm
12	TPDG-THD-DG25	Thread-in Drill Guide, 2.5mm
13	TPDG-THD-DG20	Thread-in Drill Guide, 2.0mm
14	DRLL-SSC-25040	Drill, 2.5mm x 40mm
15	DRVR-UQC-T10	Driver, T10
16	DRLL-SSC-20040	Drill, 2.0mm x 40mm
17	DRVR-AOS-S20	Driver, Square Tip 2.0mm

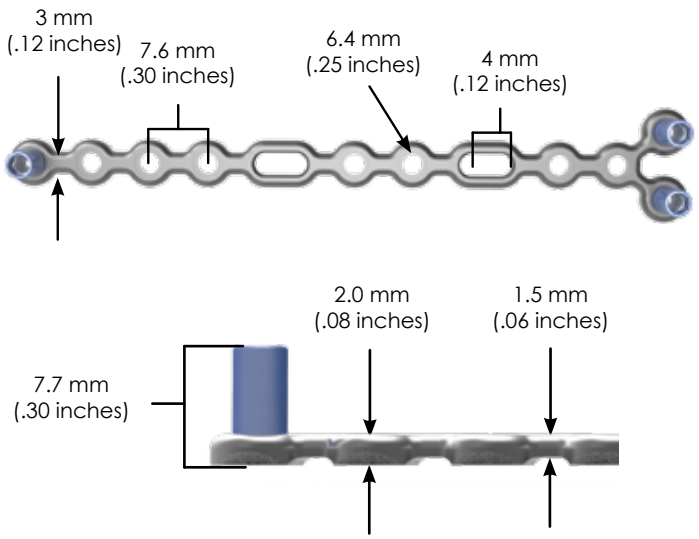
GEMINUS VOLAR PLATES



PROTEAN FRAGMENT PLATES



PROTEAN FRAGMENT PLATES (Cont.)



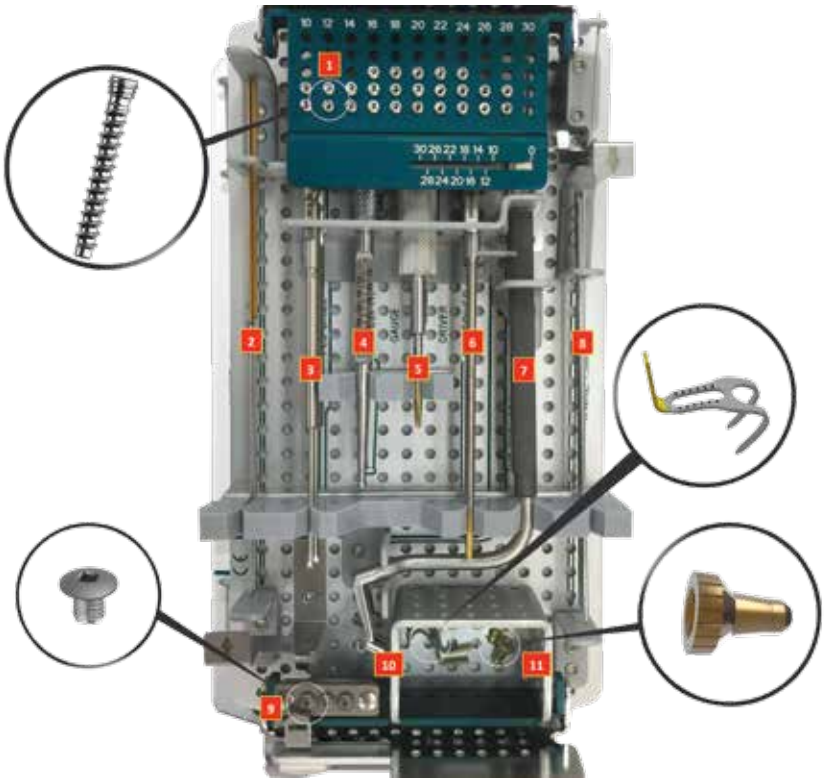
Single Use Instruments	Catalog Number	Dimensions
	DRLL-SSC-20040	Drill, 2.0mm x 40mm
	DRLL-SSC-25040	Drill, 2.5mm x 40mm
	DRLL-PLS-20	Drill, Cannulated 2.0mm x 40mm
	DRVR-AOS-S20	Driver, Square Tip 2.0mm
	DRVR-UQC-T10	Driver, Quick Connect T10
	DRVR-AOS-PLS	Final Driver, PLS
	PDG-AIM-015	A.I.M.ing Guide, 1.5mm
	KWIR-STD-09152	K-Wire, .9mm x 152mm
	KWIR-STD-15127	K-Wire, 1.5mm x 127mm
	PLS-AIM-0910	PLS A,I,M,ng Guide

Loc #		Catalog #	Description
1		WBTN-2750-T	Washer, Button, Inside Ø2.7mm, Outside Ø5.0mm, Ti
2		SPLS-20100-TS	Smooth Peg, Locking, 2.0mm x 10mm, Ti
		SPLS-20120-TS	Smooth Peg, Locking, 2.0mm x 12mm, Ti
		SPLS-20140-TS	Smooth Peg, Locking, 2.0mm x 14mm, Ti
		SPLS-20160-TS	Smooth Peg, Locking, 2.0mm x 16mm, Ti
		SPLS-20170-TS	Smooth Peg, Locking, 2.0mm x 17mm, Ti
		SPLS-20180-TS	Smooth Peg, Locking, 2.0mm x 18mm, Ti
		SPLS-20190-TS	Smooth Peg, Locking, 2.0mm x 19mm, Ti
		SPLS-20200-TS	Smooth Peg, Locking, 2.0mm x 20mm, Ti
		SPLS-20210-TS	Smooth Peg, Locking, 2.0mm x 21mm, Ti
		SPLS-20220-TS	Smooth Peg, Locking, 2.0mm x 22mm, Ti
		SPLS-20230-TS	Smooth Peg, Locking, 2.0mm x 23mm, Ti
		SPLS-20240-TS	Smooth Peg, Locking, 2.0mm x 24mm, Ti
		SPLS-20260-TS	Smooth Peg, Locking, 2.0mm x 26mm, Ti
		SPLS-20280-TS	Smooth Peg, Locking, 2.0mm x 28mm, Ti
		SPLS-20300-TS	Smooth Peg, Locking, 2.0mm x 30mm, Ti
3		TPLS-23100-TS	Threaded Peg, Locking, 2.3mm x 10mm, Ti
		TPLS-23120-TS	Threaded Peg, Locking, 2.3mm x 12mm, Ti
		TPLS-23140-TS	Threaded Peg, Locking, 2.3mm x 14mm, Ti
		TPLS-23160-TS	Threaded Peg, Locking, 2.3mm x 16mm, Ti
		TPLS-23170-TS	Threaded Peg, Locking, 2.3mm x 17mm, Ti
		TPLS-23180-TS	Threaded Peg, Locking, 2.3mm x 18mm, Ti
		TPLS-23190-TS	Threaded Peg, Locking, 2.3mm x 19mm, Ti
		TPLS-23200-TS	Threaded Peg, Locking, 2.3mm x 20mm, Ti
		TPLS-23210-TS	Threaded Peg, Locking, 2.3mm x 21mm, Ti

SCREW CADDY (Cont.)

Loc #	Catalog #	Description
3 (cont.)	TPLS-23220-TS	Threaded Peg, Locking, 2.3mm x 22mm, Ti
	TPLS-23230-TS	Threaded Peg, Locking, 2.3mm x 23mm, Ti
	TPLS-23240-TS	Threaded Peg, Locking, 2.3mm x 24mm, Ti
	TPLS-23260-TS	Threaded Peg, Locking, 2.3mm x 26mm, Ti
	TPLS-23280-TS	Threaded Peg, Locking, 2.3mm x 28mm, Ti
	TPLS-23300-TS	Threaded Peg, Locking, 2.3mm x 30mm, Ti
4	KWIR-STD-15127	K-Wire, Standard Tip, 1.5mm x 127mm
5 	PDG-AIM-015	A.I.M.ing Guides, 1.5mm
6 	TPNL-27100-TS	Threaded Peg, Non Locking, 2.7mm x 10mm, Ti
	TPNL-27120-TS	Threaded Peg, Non Locking, 2.7mm x 12mm, Ti
	TPNL-27140-TS	Threaded Peg, Non Locking, 2.7mm x 14mm, Ti
	TPNL-27160-TS	Threaded Peg, Non Locking, 2.7mm x 16mm, Ti
	TPNL-27180-TS	Threaded Peg, Non Locking, 2.7mm x 18mm, Ti
	TPNL-27200-TS	Threaded Peg, Non Locking, 2.7mm x 20mm, Ti
	TPNL-27220-TS	Threaded Peg, Non Locking, 2.7mm x 22mm, Ti
	TPNL-27240-TS	Threaded Peg, Non Locking, 2.7mm x 24mm, Ti
	TPNL-27260-TS	Threaded Peg, Non Locking, 2.7mm x 26mm, Ti
	TPNL-27280-TS	Threaded Peg, Non Locking, 2.7mm x 28mm, Ti
	TPNL-27300-TS	Threaded Peg, Non Locking, 2.7mm x 30mm, Ti
7 	HCLP-27100-TS	High Compression Locking Peg, 2.7mm x 10mm, Ti
	HCLP-27120-TS	High Compression Locking Peg, 2.7mm x 12mm, Ti
	HCLP-27140-TS	High Compression Locking Peg, 2.7mm x 14mm, Ti
	HCLP-27160-TS	High Compression Locking Peg, 2.7mm x 16mm, Ti
	HCLP-27180-TS	High Compression Locking Peg, 2.7mm x 18mm, Ti
	HCLP-27190-TS	High Compression Locking Peg, 2.7mm x 19mm, Ti
	HCLP-27200-TS	High Compression Locking Peg, 2.7mm x 20mm, Ti
	HCLP-27210-TS	High Compression Locking Peg, 2.7mm x 21mm, Ti
	HCLP-27220-TS	High Compression Locking Peg, 2.7mm x 22mm, Ti
	HCLP-27230-TS	High Compression Locking Peg, 2.7mm x 23mm, Ti
	HCLP-27240-TS	High Compression Locking Peg, 2.7mm x 24mm, Ti
	HCLP-27260-TS	High Compression Locking Peg, 2.7mm x 26mm, Ti
	HCLP-27280-TS	High Compression Locking Peg, 2.7mm x 28mm, Ti
	HCLP-27300-TS	High Compression Locking Peg, 2.7mm x 30mm, Ti
8 	PANL-35080-TS	Screw, Cortical Non Locking, 3.5mm x 8mm, Ti
	PANL-35090-TS	Screw, Cortical Non Locking, 3.5mm x 9mm, Ti
	PANL-35100-TS	Screw, Cortical Non Locking, 3.5mm x 10mm, Ti
	PANL-35110-TS	Screw, Cortical Non Locking, 3.5mm x 11mm, Ti
	PANL-35120-TS	Screw, Cortical Non Locking, 3.5mm x 12mm, Ti
	PANL-35130-TS	Screw, Cortical Non Locking, 3.5mm x 13mm, Ti
	PANL-35140-TS	Screw, Cortical Non Locking, 3.5mm x 14mm, Ti
	PANL-35150-TS	Screw, Cortical Non Locking, 3.5mm x 15mm, Ti
	PANL-35160-TS	Screw, Cortical Non Locking, 3.5mm x 16mm, Ti
	PANL-35180-TS	Screw, Cortical Non Locking, 3.5mm x 18mm, Ti
9 	COLS-35080-TS	Screw, Cortical Locking, 3.5mm x 8mm, Ti
	COLS-35090-TS	Screw, Cortical Locking, 3.5mm x 9mm, Ti
	COLS-35100-TS	Screw, Cortical Locking, 3.5mm x 10mm, Ti
	COLS-35110-TS	Screw, Cortical Locking, 3.5mm x 11mm, Ti
	COLS-35120-TS	Screw, Cortical Locking, 3.5mm x 12mm, Ti
	COLS-35130-TS	Screw, Cortical Locking, 3.5mm x 13mm, Ti
	COLS-35140-TS	Screw, Cortical Locking, 3.5mm x 14mm, Ti
	COLS-35150-TS	Screw, Cortical Locking, 3.5mm x 15mm, Ti
	COLS-35160-TS	Screw, Cortical Locking, 3.5mm x 16mm, Ti
	COLS-35180-TS	Screw, Cortical Locking, 3.5mm x 18mm, Ti

PLS and HPE Module (Bottom Base of Tray)

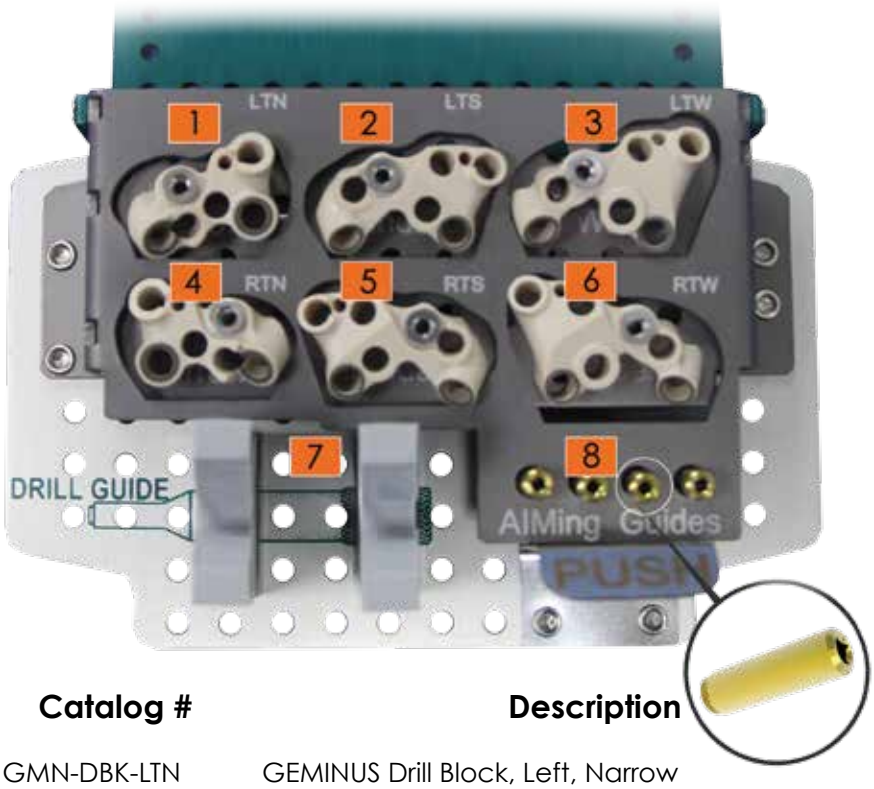


Loc #	Catalog #	Description
1	PALS-25100-CC	Screw, Polyaxial Locking, 2.5mm x 10mm Cannulated, CoCr
	PALS-25120-CC	Screw, Polyaxial Locking, 2.5mm x 12mm Cannulated, CoCr
	PALS-25140-CC	Screw, Polyaxial Locking, 2.5mm x 14mm Cannulated, CoCr
	PALS-25160-CC	Screw, Polyaxial Locking, 2.5mm x 16mm Cannulated, CoCr
	PALS-25180-CC	Screw, Polyaxial Locking, 2.5mm x 18mm Cannulated, CoCr
	PALS-25200-CC	Screw, Polyaxial Locking, 2.5mm x 20mm Cannulated, CoCr
	PALS-25220-CC	Screw, Polyaxial Locking, 2.5mm x 22mm Cannulated, CoCr
	PALS-25240-CC	Screw, Polyaxial Locking, 2.5mm x 24mm Cannulated, CoCr
	PALS-25260-CC	Screw, Polyaxial Locking, 2.5mm x 26mm Cannulated, CoCr
	PALS-25280-CC	Screw, Polyaxial Locking, 2.5mm x 28mm Cannulated, CoCr
	PALS-25300-CC	Screw, Polyaxial Locking, 2.5mm x 30mm Cannulated, CoCr
2	KWIR-STD-09152	K-Wire, Standard Tip, .9mm x 152mm
3	DRLL-PLS-20	Drill, Cannulated, Polyaxial Locking Screw, 2.0mm
4	GMN-CDG-PLS	Cannulated Depth Gauge, Polyaxial Locking Screw
5	GMN-ID-PLS	Initial Driver, Polyaxial Locking Screw
6	DRVR-AOS-PLS	Driver, AO Connection, Polyaxial Locking Screw
7	GMN-HP-DG15	GEMINUS Hook Plate Reduction Tool
8	KWIR-STD-15127	K-Wire, Standard Tip, 1.5mm x 127mm
9	GMN-HP-SCRW	GEMINUS Hook Plate, Screw
10	GMN-HP	GEMINUS Hook Plate
11	PLS-AIM-0910	PLS A.I.M.ing Guide

Accessory Instrumentation (Bottom Base of Tray)

Loc #	Catalog #	Description
	Bottom Tray	
12	GMN-FSP-PLB	GEMINUS Plate Bender
13	GMN-FSP-PLH	GEMINUS Plate Holder
14	PRT-BND-PLR	PROTEAN Bending Pliers

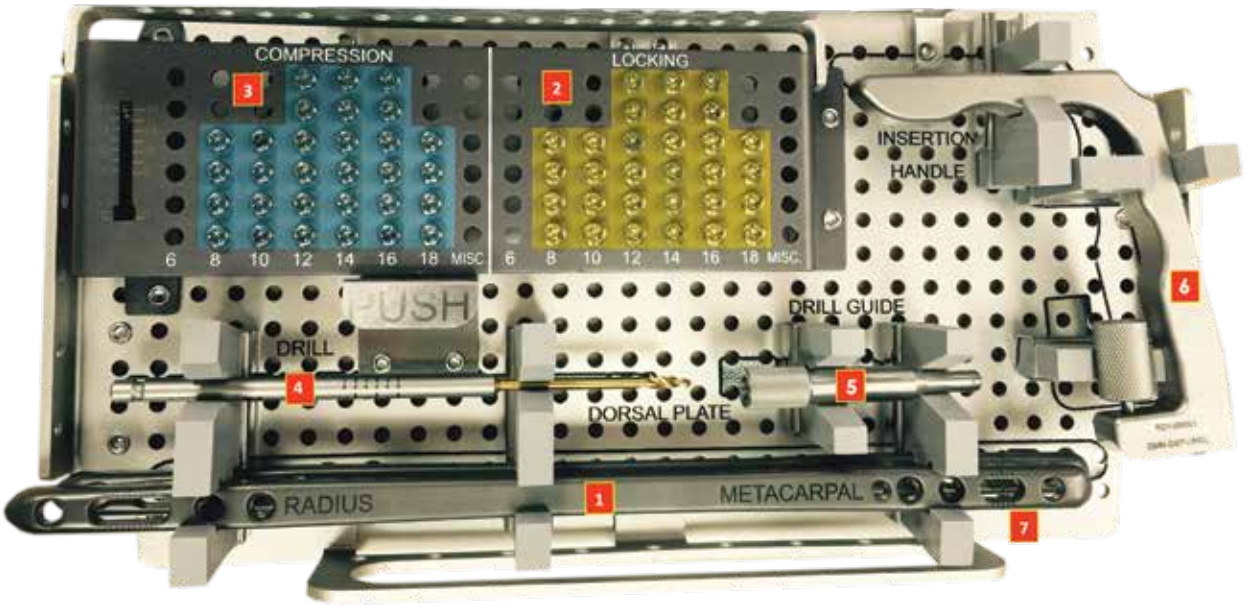
Optional Drill Block Module



Loc #	Catalog #	Description
1	GMN-DBK-LTN	GEMINUS Drill Block, Left, Narrow
2	GMN-DBK-LTS	GEMINUS Drill Block, Left, Standard
3	GMN-DBK-LTW	GEMINUS Drill Block, Left, Wide
4	GMN-DBK-RTN	GEMINUS Drill Block, Right, Narrow
5	GMN-DBK-RTS	GEMINUS Drill Block, Right, Standard
6	GMN-DBK-RTW	GEMINUS Drill Block, Right, Wide
7	TPDG-THD-DG20	Thread-In Drill Guide, 2.0mm (Located in upper tray)
8	DBK-AIM-015	GEMINUS Drill Block, A.I.M.ing Guide, 1.5mm

GEMINUS Dorsal Spanning Plate – GMN-DSP-SYS

INSTRUMENT TRAY



Loc #	Catalog #	Description
1	GMN-DSP-210	Dorsal Spanning Plate (long)
	GMN-DSP-160	Dorsal Spanning Plate (short)
2	MTLS-30080-TS	Screw, Multi-Thread, Locking, 3.0mm x 8mm, Ti
	MTLS-30100-TS	Screw, Multi-Thread, Locking, 3.0mm x 10mm, Ti
	MTLS-30120-TS	Screw, Multi-Thread, Locking, 3.0mm x 12mm, Ti
	MTLS-30140-TS	Screw, Multi-Thread, Locking, 3.0mm x 14mm, Ti
	MTLS-30160-TS	Screw, Multi-Thread, Locking, 3.0mm x 16mm, Ti
	MTLS-30180-TS	Screw, Multi-Thread, Locking, 3.0mm x 18mm, Ti
3	MTNL-30080-TS	Screw, Multi-Thread, Compression, 3.0mm x 8mm, Ti
	MTNL-30100-TS	Screw, Multi-Thread, Compression, 3.0mm x 10mm, Ti
	MTNL-30120-TS	Screw, Multi-Thread, Compression, 3.0mm x 12mm, Ti
	MTNL-30140-TS	Screw, Multi-Thread, Compression, 3.0mm x 14mm, Ti
	MTNL-30160-TS	Screw, Multi-Thread, Compression, 3.0mm x 16mm, Ti
	MTNL-30180-TS	Screw, Multi-Thread, Compression, 3.0mm x 18mm, Ti

Instruments

4	DRLL-SSC-23040	Drill, 2.3mm X 40mm
5	TPDG-THD-DG23	Thread-In Drill Guide, 2.3mm
6	GMN-DSP-HNDL	Assembled, Handle, Dorsal Spanning Plate
7	GMN-DSP-TRAY	Instrument Tray, Dorsal Spanning Plate

Dorsal Spanning Plate

Dorsal Spanning Plate, Long, 210 mm Ti

Dorsal Spanning Plate, Short, 160mm Ti

NOTES

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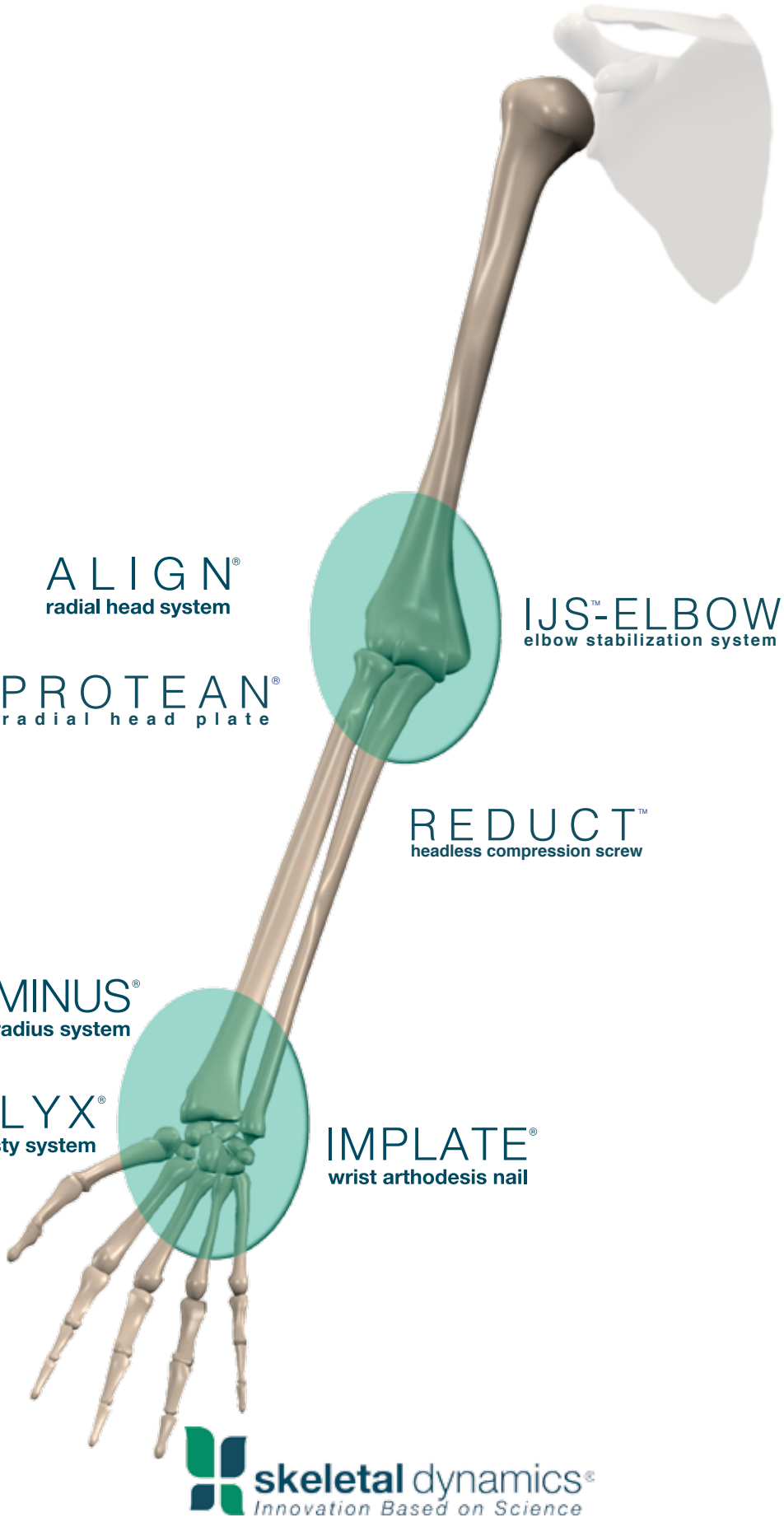

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