ENG

Integra®

Spider™ and Mini-Spider™ Limited Wrist Fusion System

SURGICAL TECHNIQUE

INTEGRA®
LIMIT UNCERTAINTY

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Spider™ & Mini Spider™
The original circular plates designed for limited wrist fusion

Indications

The use of a Limited Wrist Fusion Plate is indicated in patients with post-traumatic or degenerative wrist arthritis, and failed carpal instability partial wrist arthrodesis. Wrist arthrodesis can also be utilized in patients with complex fractures of the wrist. A fusion plate can be utilized in patients with rheumatoid arthritis.

Contraindications

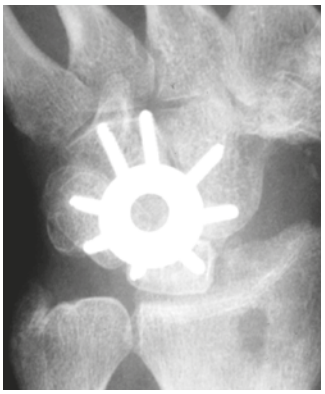
Contraindications for the use of a limited wrist fusion plate include any condition that would contraindicate the use of plates and screws in general, including: severe tendon, neurological or vascular deficiencies which may compromise the affected extremity, any concomitant disease which may compromise the function of the plate, or infection.

Features

- Recessed plate reduces the possibility of dorsal impingement.
- Circular plates specifically designed for inter-carpal fusion.
- Screw hole positioning allows for 2 screws in each bone.
- Open center hole allows for additional bone graft and visualization.
- Simple and straightforward instrumentation.
- Instant rigid fixation for «Four Corner» fusion and STT fusion.

Component Materials

- **8-Hole and 6-Hole Plate:** Stainless Steel or Titanium
- **Screws:** Stainless Steel or Titanium



Integra as the manufacturer of this device, does not practice medicine and does not recommend this or any other surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and using the appropriate techniques for implanting the device in each patient.

Surgical Technique for Four-Corner Limited Wrist Fusion Using the Spider™ Plate

Introduction

The Spider™ Limited Wrist Fusion Plate can be utilized in various locations throughout the wrist for specific fusions. The plate has been used successfully for luno-triquetro-capito-hamate (four-corner) fusion, scaphocapitate (SC) fusion, radioscapholunate (RSL) fusion, scapholunacapitate (SLC) fusion, and scaphotrapezium trapezoid (STT) fusion.
The preparation of the site to be fused and the specific techniques are fairly similar regardless of where the fusion is desired. The larger plate's design has been optimized for the four-corner limited arthrodesis, and the surgical technique for this particular procedure will be presented, although with minimal modifications can be utilized for other limited wrist fusions for which the plate is sized correctly.

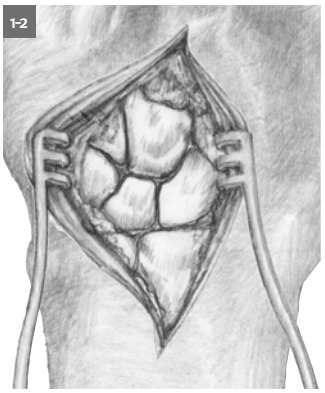
Step 1

After appropriate general or regional block anesthesia and applying the tourniquet to the upper extremity to 250 mm of Mercury, a longitudinal 7 cm incision is made centered over the dorsal wrist. Alternately, a transverse 6cm incision can be utilized. (fig. 1-1)

1-1

Dissection is carried down through the subcutaneous tissues taking care to protect the sensory branch of the radial and ulnar nerve fibers. In patients who have a SLAC deformity and require scaphoid excision, exposure is undertaken through the third dorsal compartment transposing the extensor pollicis longus tendon radially. The incision is taken from the third compartment, between the second and fourth compartments, distally through the capsule exposing the scaphoid. The scaphoid is generally removed in a seperate parts using a rongeur, taking care to protect the extrinsic ligaments. Inserting a 1.6mm K-wire into the scaphoid (like a joystick) will assist in mobilization and simplify excision. A radial styloidectomy may be indicated, and care should be taken to avoid disruption of the extrinsic ligaments with the styloidectomy itself. Exposure of the four-bone region encompassing the lunate, triquetrum, capitate, and hamate can be undertaken through this incision. (fig. 1-2)

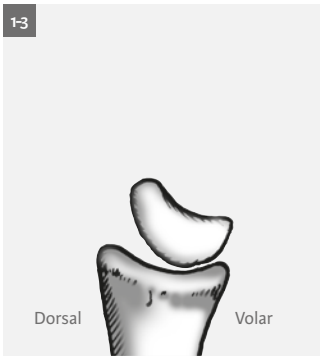
1-2



Alternately, a separate longitudinal incision can be made between the fourth and fifth compartments, or an anatomical dorsal ligament sparing approach can be used, either of which provides direct exposure to the four-bone region. These techniques are also utilized in patients who undergo a four-corner fusion for stability alone where the scaphoid does not require excision.

Reduction / Provisional Fixation for Spider™ Plate.

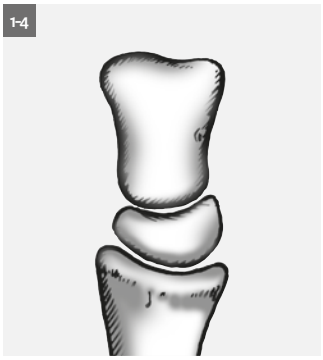
1-3



.062" K-wire (Palmar - flexed)

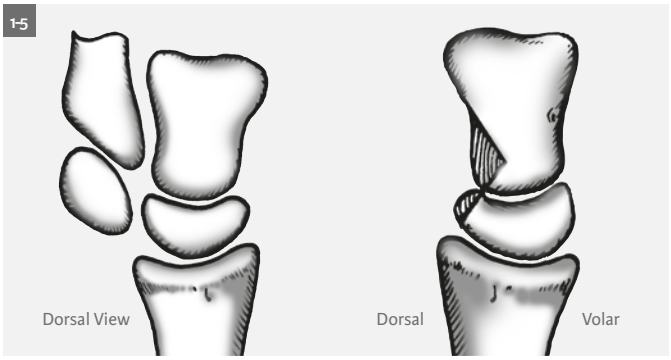
1-3 Extended lunate in classic DISI deformity. Insert .062" K-wire to use as a "joystick".

1-4



1-4 Reduce lunate into a neutral position.

1-5



Lateral View (Rasp dorsally, fixation is volar.)

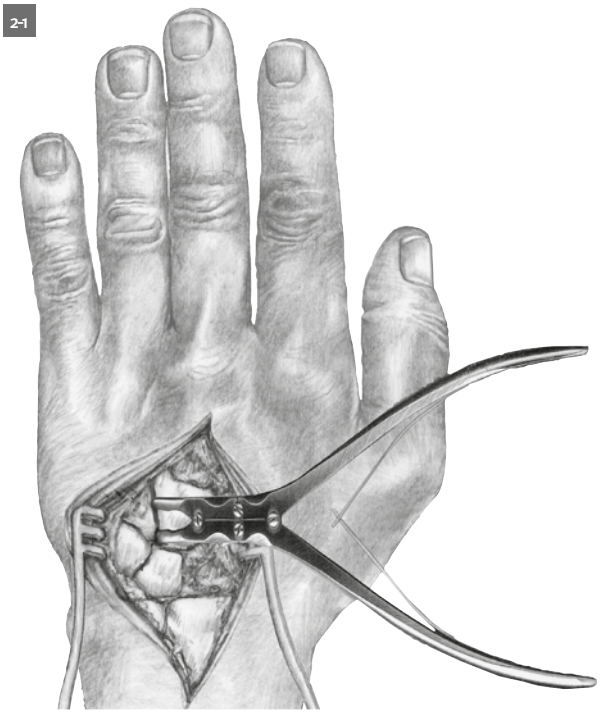
1-5 Place provisional fixation with K-wire from the ulnar carpus to tramsfix the bones to be fused. The K-wire should be placed into the volar 1/2 of the carpus to avoid impingement with the rasp for the Spider™ plate.

After appropriately exposing the capitate, hamate, lunate, and triquetrum, any rotational instability of any of the four bones is reduced and temporary percutaneous K-wire fixation (1.1 mm) is accomplished keeping the K-wires as volar as possible within the four bones. It is especially important to ensure complete reduction of the lunate. Provisional fixation in the volar half of the carpal bones that are being fused, tend to produce less toggle to the carpus while rasping is being performed. This provisional fixation makes the rasping procedure more stable and provides a more predictable resistance to the rasp itself, providing a more uniform, circumferential, recessed defect to accept the plate and bone graft. (fig. 2a)

Step 2

A small rongeur is used to denude cartilage between the four bones down through subchondral bone to good cancellous bone.

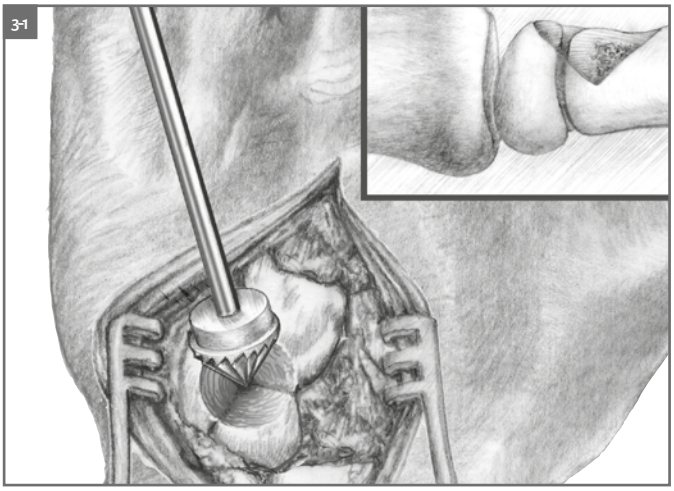
2-1



Step 3

The Spider™ rasp is then centered both A/P and laterally over the four-corner junction and used to rasp down, at least flush with, or even below the bone surface, of the dorsal aspect of the carpus. The defect from the Spider™ rasp exactly complements the size, shape and contour of the Spider™ plate. Rasping can be done manually or with the power attachment. This technique allows necessary exposure of the sub-chondral bone in the four-corner region prior to plate placement. (fig 3-1)

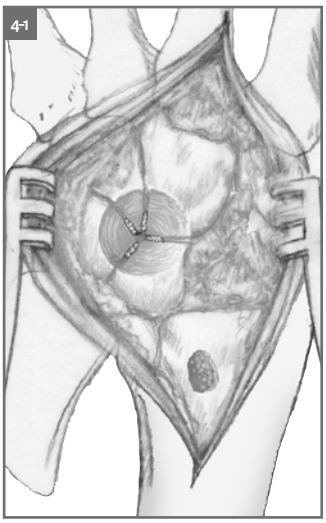
3-1



Step 4

Autogenous cancellous bone graft taken from either the excised scaphoid, Lister's tubercle in the distal radius, or from the iliac crest is then packed between each of the joint surfaces and the junction of the four-corner fusion at the bottom of the rasped defect. Bone substitutes like Integra OS™, could be used instead or with cancellous bone graft.

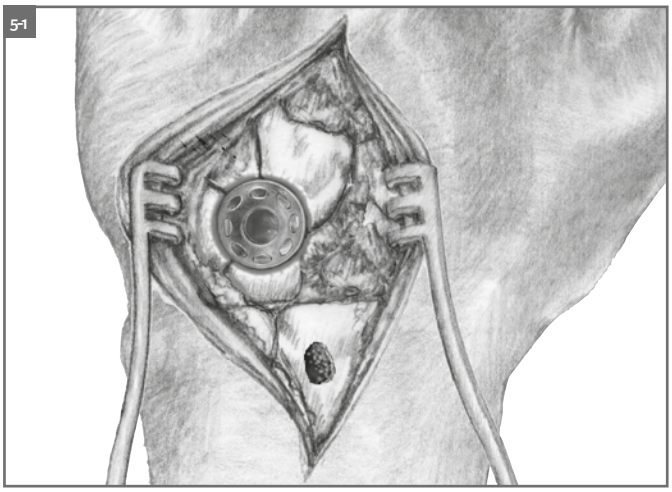
4-1



Step 5: Plate Implantation and First Screw

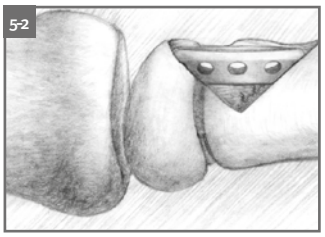
After appropriate packing of the bone graft, the Spider™ plate is then aligned to allow maximum screw placement in each of the four bones. (fig. 5-1) With careful alignment, in general, two screws can be placed within each of the four bones.

5-1



Caution
Be careful to ensure that the plate is at or below the level of the remaining carpus (recessed)

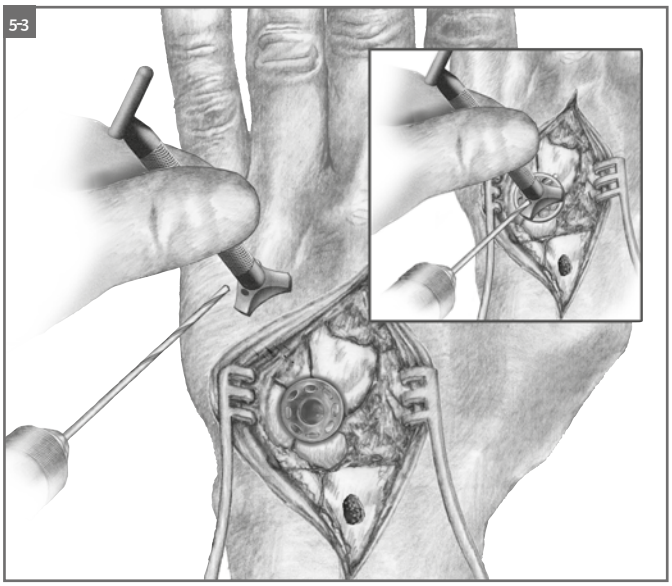
5-2



The first inserted screw is the lunate screw. Use the plate holder instrument or the swiveling drill guide for drilling this first hole.

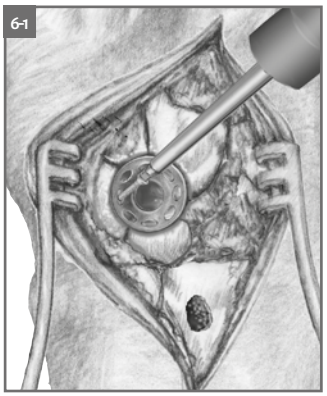
After this step, the screw is inserted by using the self retainer screw driver.
Do not tighten this first screw before implantation of the other screws.

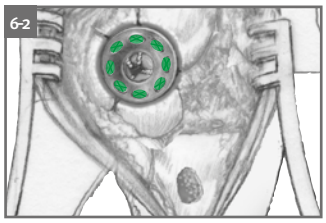
5-3



Step 6: Screws Implantation

Then drill a second hole for screw placement in a diametric orientation to the lunate screw, in order to balance the plate upon initial fixation. (fig 6-1)



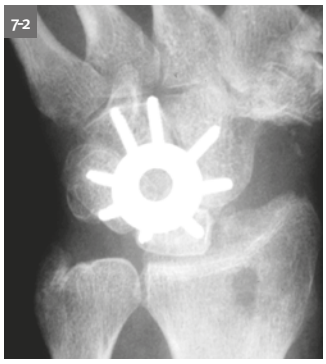


Initially, place one screw without tightening in each of the four bones, utilizing the 8mm, 10mm, 12mm and 14mm length, 2.4mm diameter cancellous self-tapping screws to fix the plate down. (fig 6-2)

Should problems occur with either the drilling or placement of the self-tapping 2.4mm cancellous screws that involve lack of purchase in the carpus, the 2.8mm cancellous self-tapping screws can be utilized as salvage screws through the plate. In this case, the screw head will be prominent but will still rest below the profile of the plate and below the level of the carpus. Then, place the other screws. With careful alignment, in general, two screws can be placed within each of the four bones.

Step 7: Plate Fixation

Screws should be placed in a tightened fashion to allow compression of the four bones. The remaining screws should be of appropriate length to allow excellent purchase, yet avoid protrusion and impingement with the articular surfaces. Intraoperative fluoroscopy and standard AP and lateral radiographs are undertaken to ensure appropriate placement and screw fixation. Range of motion testing is undertaken to ensure the requested stability and lack of impingement of the fusion plate. It is advised to add addtional bone graft or a bone substitute.



Postoperative Protocol Care

Irrigation and debridement of the wound is undertaken and sequential repair of the capsule and retinacular structures are undertaken using #4-0 absorbable sutures. After skin closure, a short-arm lightly bulky splint is placed allowing early active finger range of motion.
Postoperatively, after the sutures have been removed at approximately one week, either a removable splint can be placed to allow early active range of motion exercises or alternately a short arm cast can be placed for three to four weeks of protection. Radiographs should be taken on a sequential basis to ensure appropriate fusion of the four-corner region prior to allowing return to normal activities.

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Surgical Technique for Mini-Spider™ Limited Wrist Fusion Using the Spider™ Plate

Introduction - Scaphotrapezium - trapezoid (STT) fusion

The Mini-Spider™ Limited Wrist Fusion Plate (6-holes) can be utilized in **various locations** throughout the wrist for specific fusion procedures. The plate has been used successfully for:

- Scaphotrapezium-trapezoid (STT) fusion
- Scaphocapitate (SC) fusion
- Luno-triquetro-capito-hamate (4 corner) fusion

Preparation of the site to be fused and the specific techniques are **fairly similar** regardless of where the fusion is desired. The Mini-Spider™ plate has been optimized for the **scaphotrapezium-trapezoid arthrodesis**. However, the plate can be utilized for other limited wrist fusion procedures for which the plate is appropriately sized.

Step 1 - Skin incision and exposure

- A dorsal longitudinal **incision** is made over the wrist in line with the scaphotrapezium-trapezoid joint, **extending** proximally in line with the Extensor Pollicis Longus to Lister's tubercle (fig. 1-1).
- The extensor retinaculum is incised and released distal to Lister's tubercle.
- Alternately, **a transverse incision** can be utilized for joint exposure.
- **A radial styloidectomy** may be indicated.

1-1

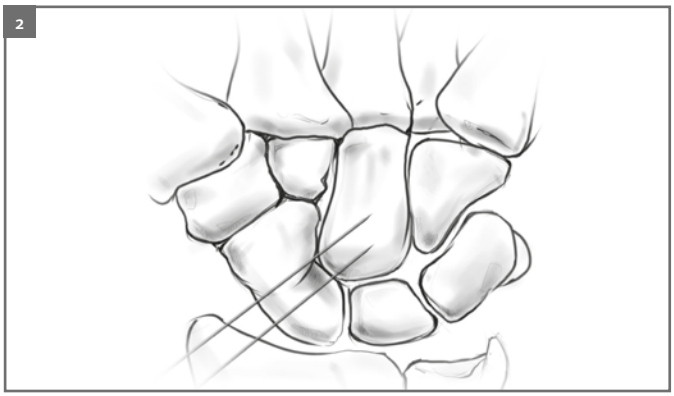
Scaphoid reduction

- If the scaphoid is **subluxed**, reduction to normal anatomic position is facilitated by introducing an instrument such as a **hemostat** under **the distal pole** of the scaphoid in line with the radioscapho-capitate ligament.
- Using the hemostat, **de-rotate the scaphoid,** bringing the proximal articulation of the scaphoid into a normal anatomic alignment with the radial fossa.
- Provisional **pinning** is utilized to maintain reduction throughout the procedure.

Step 2 - Provisional K-wire fixation

- The provisional K-Wire fixation **maintains the reduction, provides a resistance** to the Rasp, **prevents toggling** of the bones and produces a more uniform defect for the plate.
- **Two 1.1mm (.045")** K-Wires are inserted parallel through the scaphoid into the capitate to fixate the scaphoid.
- K-Wires are positioned to avoid the rasped defect and they should **not engage the radiocarpal joint** (Fig. 2).
- If indicated, additional K-Wires may be inserted, fixating the trapezium to the trapezoid and retrograde fixation of the trapezoid to the scaphoid.

2



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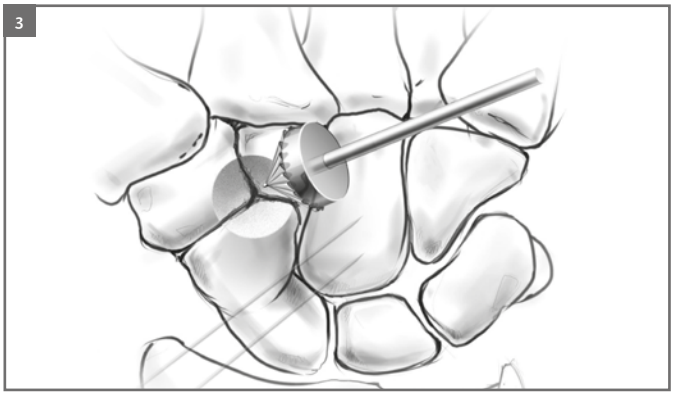

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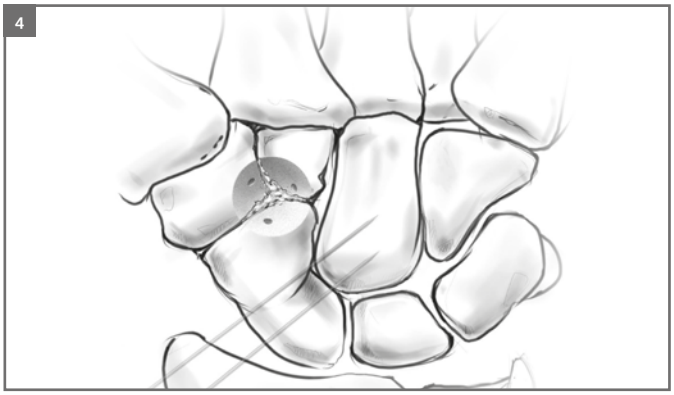


Step 3 - Rasping

- The Mini-Spider™ Rasp is **centered** over the STT joint and used to rasp down, **at least flush with or even below** the bone surface of the dorsal aspect of the carpus.
- The defect from the Mini-Spider™ Rasp **exactly matches** the size, shape and contour of the Mini-Spider™ Plate.
- Rasping can be done manually or with a power attachment (Fig. 3).

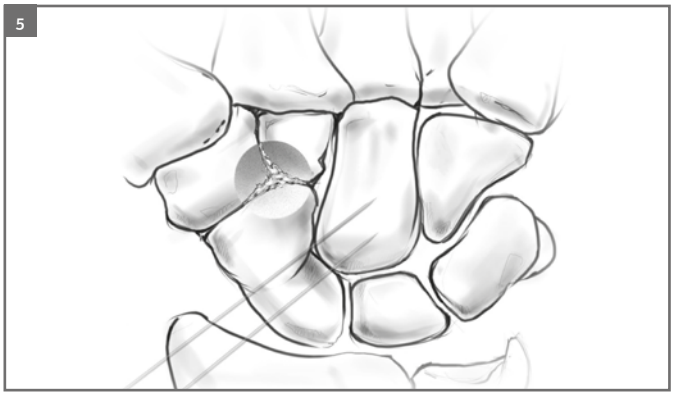
Step 4 - Denude the cartilage

- A small **Rongeur** is used to denude the cartilage between the three bones down through **subchondral bone** to good cancellous bone.
- To achieve optimal cancellous bone contact for fusion, denuding of the cartilage is taken down to the **volar aspect** of the STT joint.
- Alternately, prior to denuding of the interstices, **pilot holes** are drilled into each of the **STT bones** utilizing the Mini-Spider™ plate and one screw into each of the bones.
- This facilitates **anatomic alignment** prior to denuding the interstices and packing of the bone graft (Fig. 4).

Step 5 - Bone grafting

- Autogenous cancellous bone graft is taken from Lister's tubercle or from the iliac crest.
- The graft is packed between each of the joint surfaces and the junction of the STT fusion down through the volar aspect of the rasped defect.
- It is important that no bone graft has extruded into the scapho-capitate joint space (Fig. 5).

5



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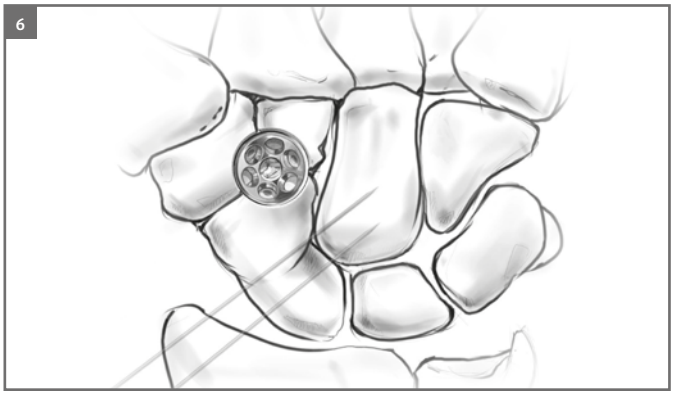

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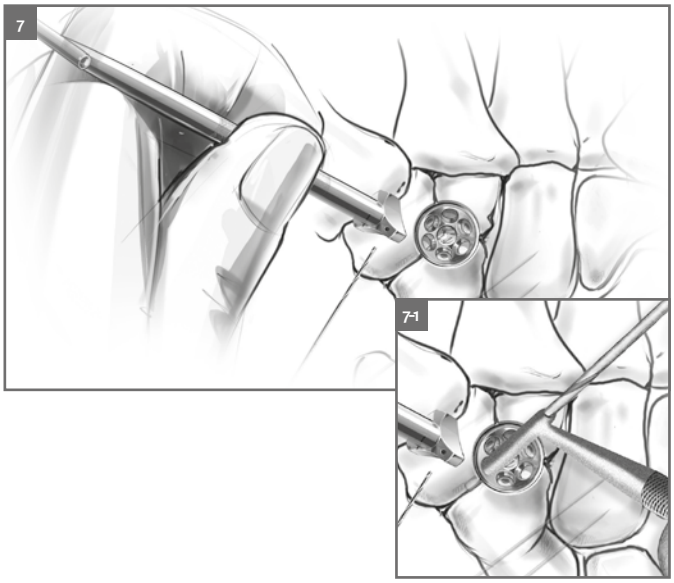

7-1

Step 6 - Application of the mini-Spider™ plate

- Place the Mini-Spider™ Plate into the rasped defect.
- Ensure that the plate is at least flush or recessed relative to the level of the remaining dorsal carpal cortex.
- Confirm proper alignment and adequate recession of the plate utilizing fluoroscopy (Fig. 6).
- Using the Mini-Spider™ Plate Holder/Drill Guide instrument, rotate the plate for optimal alignment, allowing for two screws in each of the STT bones (Fig. 7).
- For hole placement, use either end of the Plate Holder/Drill Guide* (Fig. 7-1).
- Anatomic considerations may permit only one screw in the trapezoid.
- Proper screw depth and placement should not compromise the 1st CMC joint, or the capitate articulation.
- Tighten all the screws in a balanced fashion. Intraoperative fluoroscopy and standard AP and lateral radiographs are undertaken to ensure appropriate placement and screw fixation.
- Range of motion testing is also performed.
- Additional bone graft can be packed into the center portion of the STT fusion through the plate (Fig. 8).

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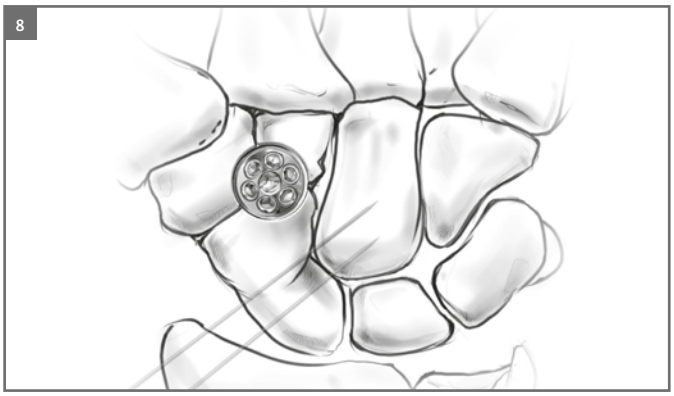

Post-operative care

- Irrigation and debridement of the wound is undertaken and sequential repair of the capsule is performed.
- The distal aspect of the extensor retinaculum is transposed under the EPL and utilized as a flap at the distal radius.
- After skin closure, a short-arm splint is placed allowing early active finger range of motion.
- After the sutures have been removed at approximately 10–14 days, either a removable splint can be used to allow early range of motion exercises, or a short-arm cast can be placed for three to four weeks of protection.
- Radiographs should be taken on a sequential basis to ensure appropriate fusion of the STT regions prior to allowing return to normal activities.

Instrumentation Set

#	Reference	Description
1	600716	Spider™ rasp cleaning brush
2	600720	Spider™ rasp
3	600718	T-Handle
4	600721	Mini Spider™ rasp
5	600715	Spider™ plate holder
6	600719	Mini Spider™ plate holder
7	600722	1.5/2.0mm Drill guide
8	600724	2.5mm Screw driver bit QC
9	600709 600704	1.5mm Drill bit 2.0mm Drill bit
10	600731	Screw forceps
11	600730	4-1/2 Screw driver handle QC
12	600706	Adjustable depth gauge
13	600740	Tap 4-1/2, 3.5mm dia.

References

Implants Stainless Steel	
References	**Description**
070005	Spider™ Limited Wrist Fusion Plate Steel
070006	Mini Spider™ Limited Wrist Fusion Plate Steel
072408	2.4 mm Bone screw
072410	2.4 mm Bone screw
072412	2.4 mm Bone screw
072414	2.4 mm Bone screw
072810	2.8 mm Bone screw
072814	2.8 mm Bone screw
072818	2.8 mm Bone screw
Implants Titanium	
References	**Description**
060005	Spider™ Limited Wrist Fusion Plate Titanium
060006	Mini Spider™ Limited Wrist Fusion Plate Titanium
062806	2.8 mm Titanium bone screw
062808	2.8 mm Titanium bone screw
062810	2.8 mm Titanium bone screw
062812	2.8 mm Titanium bone screw
062814	2.8 mm Titanium bone screw
062816	2.8 mm Titanium bone screw
062818	2.8 mm Titanium bone screw

Associated Products

> Universal2™ Total Wrist Implant System

Ferreres, A.; Lluch, A.; del Valle, M.
Universal Total Wrist Arthroplasty.
Midterm Follow-Up Study , The Journal of Hand Surgery,
Volume 36, Issue 6, June 2011, Pages 967-973.

> Integra® Total Wrist Fusion System

> The Ascension PyroCarbon Lunate

> First Choice™ DRUJ System

Integra®
Spider™ Limited Wrist Fusion System

Integra LifeSciences Services (France) SAS
Sales & Marketing EMEA
Immeuble Séquoia 2 ▪ 97 allée Alexandre Borodine
Parc technologique de la Porte des Alpes
69800 Saint Priest ▪ FRANCE
Phone: +33 (0)4 37 47 59 00 ▪ Fax +33 (0)4 37 47 59 99
emea.info@integralife.com ▪ **integralife.eu**

Customer Service
International: +33 (0)4 37 47 59 50 ▪ +33 (0)4 37 47 59 25 (Fax) ▪ csemea@integralife.com
United Kingdom: +44 (0)1 264 345 781 ▪ +44 (0)1 264 363 782 (Fax) ▪ csuk.ortho@integralife.com
France: +33 (0)4 37 47 59 10 ▪ +33 (0)4 37 47 59 29 (Fax) ▪ cs-ortho@integralife.com
Benelux: +32 (0)2 257 4130 ▪ +32 (0)2 253 2466 (Fax) ▪ custsvcbenelux@integralife.com
Switzerland: +41 (0)2 27 21 23 30 ▪ +41 (0)2 27 21 23 99 (Fax) ▪ custsvcsuisse@integralife.com

Integra LifeSciences Corporation
4900 Charlemar Drive
Cincinnati ▪ OH, 45227 ▪ USA
Phone: +33 (0)4 37 47 51 51 ▪ Fax: +33 (0)4 37 47 51 52

EC REP **Integra LifeSciences Services (France)**
Immeuble Séquoia 2 ▪ 97 allée Alexandre Borodine
Parc technologique de la Porte des Alpes
69800 Saint Priest ▪ FRANCE
Phone: +33 (0)4 37 47 59 00 ▪ Fax +33 (0)4 37 47 59 99

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