

For multiple fixation points and versatile suture placement – the FIRST triple loaded anchor on the market

# ThRevo® Suture Anchor

## Surgical Technique

### SUPERIOR STRENGTH & SUTURE MANAGEMENT

- Three sutures provide multiple fixation points
- Allows for versatile suture placement options
- Optimized thread pitch for increased pullout strength
- Self-drilling, titanium anchor
- Pre-loaded with three #2 Hi-Fi® high strength sutures

Three sutures provide versatile suture placement

Depth Marking

Eyelet Orientation Marking

Tapered Core Diameter

Cutting Tip

Suture Retention Cleat



---

# ThRevo<sup>®</sup> Shoulder Fixation System

SURGICAL TECHNIQUE

## INTRODUCTION

### **Arthroscopic Rotator Cuff Repair using Triple loaded suture anchors and Rip-Stop Sutures**

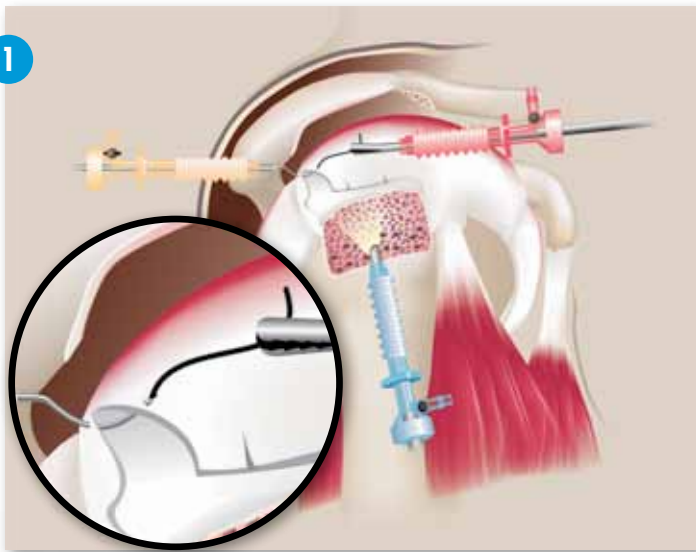
The ThRevo<sup>®</sup> Suture Anchor is a 5.0mm self-drilling titanium suture anchor that comes pre-loaded with three #2 Hi-Fi<sup>®</sup> high-strength sutures. The ThRevo Suture Anchor allows for more fixation points providing the ability to better distribute the load more evenly across the tendon. In addition, the ThRevo Suture Anchor allows for versatile suture placement.

Recently it has been shown that additional cuff holding strength is afforded when more suture fixation points were used between the anchor and the rotator cuff. (Barber and Morley 2006). In addition, the simple act of placing "rip-stop" sutures across the cuff in the anterior to posterior orientation has been shown to greatly enhance the holding strength of simple sutures. (Ma C, MacGillivray J, Clabeaux J, Lee S, Otis J. J BJS Am. 2004 Jun;86-A(6):1211-6

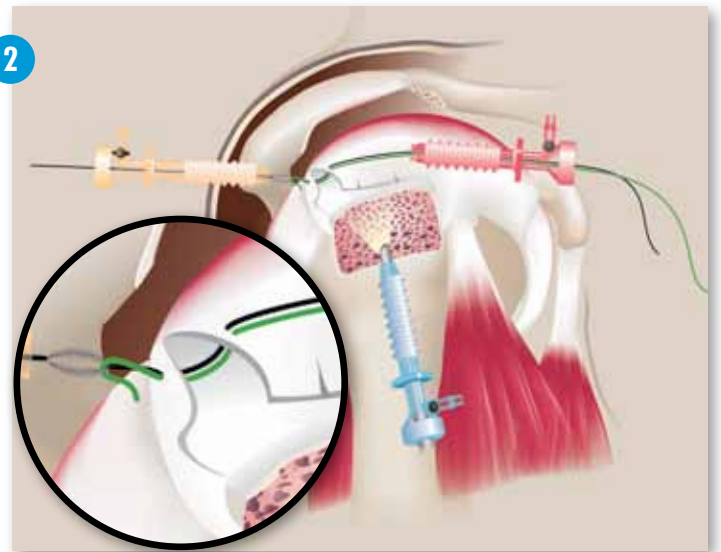
The following techniques are described  
by Stephen J. Snyder, MD, Van Nuys, CA

# ThRevo<sup>®</sup> Shoulder Fixation System

## Surgical Technique | Step by Step Rotator Cuff Repair

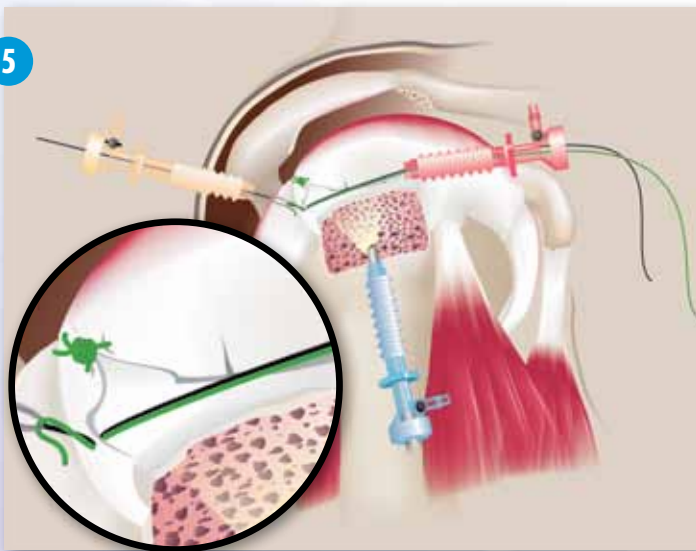


1 Begin by debriding the soft tissue and decorticating the bone of the tuberosity. Punch five or six small "bone marrow vents" in the tuberosity lateral to the anchor insertion sites.

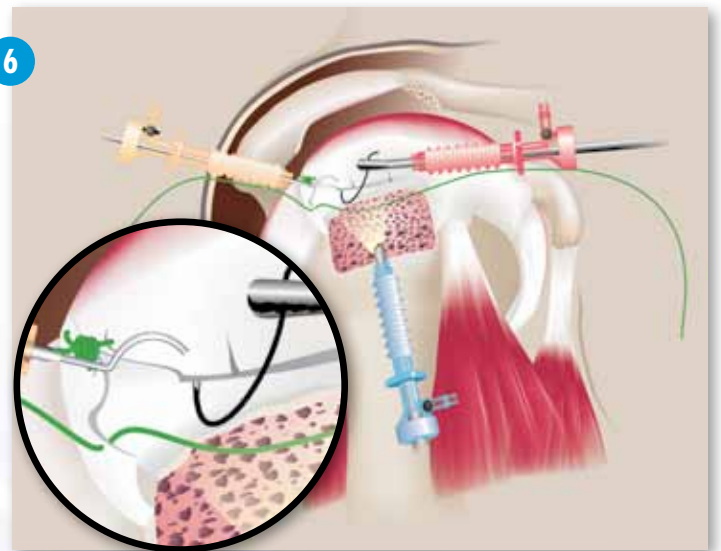


2 Load a braided #2 Hi-Fi<sup>®</sup> suture in the Shuttle-Relay<sup>™</sup> suture passer and carry it across the tear by pulling back on the opposite end.

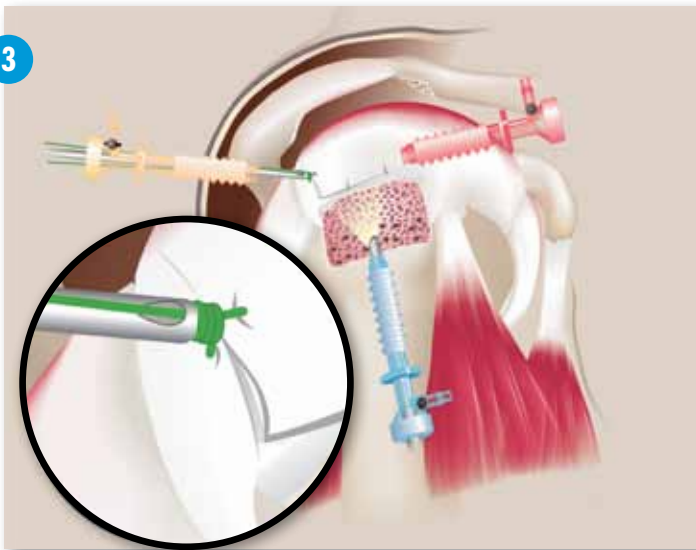
Close all significant side-to-side cuff tears. Use the direct-pass with a Spectrum<sup>®</sup> Crescent Suture Hook across the tear when possible. Pass a Shuttle Relay<sup>™</sup> Suture Passer and carry it out the opposite Dry-Doc<sup>®</sup> cannula.



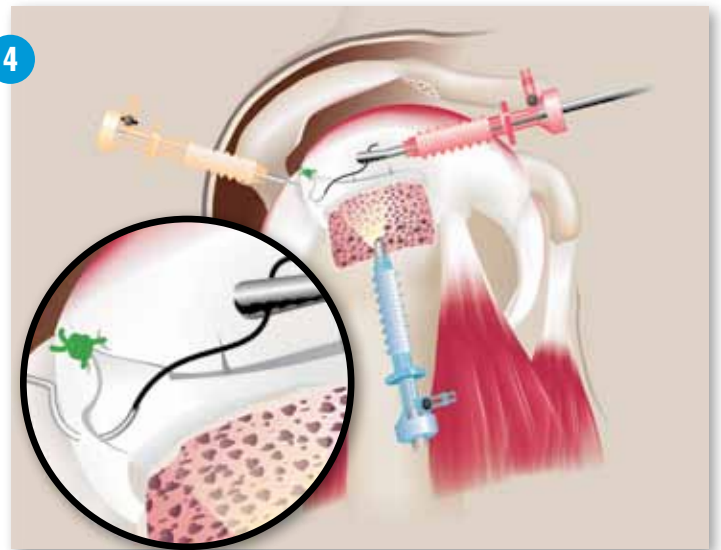
5 Pull the first limb of the suture through the stump of tendon on the tuberosity with the Shuttle Relay suture passer.



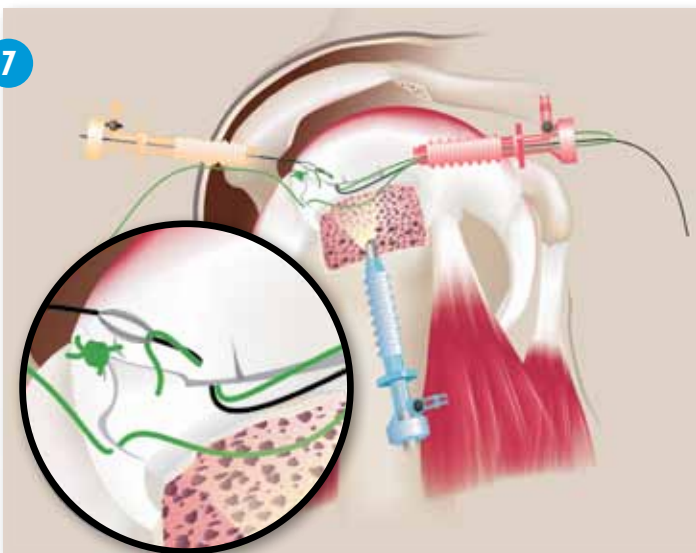
6 Pass the next 45<sup>°</sup> Spectrum<sup>®</sup> Suture Hook through the cuff just anterior to the oblique side-to-side split and carry the Shuttle Relay suture passer out the anterior Dry-Doc<sup>®</sup> cannula.



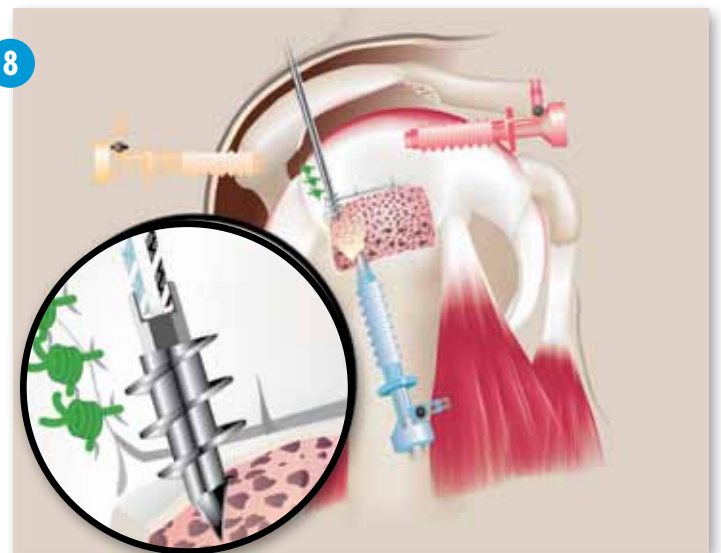
3 Tie the two sutures together using a sliding/locking knot finished with three half hitches changing the post between each one.



4 If the side-to-side tear is oblique it is often necessary to stitch using a "two-step" technique. Pass the Spectrum® 45° Suture Hook through the stump of tendon that remains on the bone and pass a Shuttle Relay™ suture passer retrieving it into the anterior Dry-Doc® cannula with a grasping forceps.



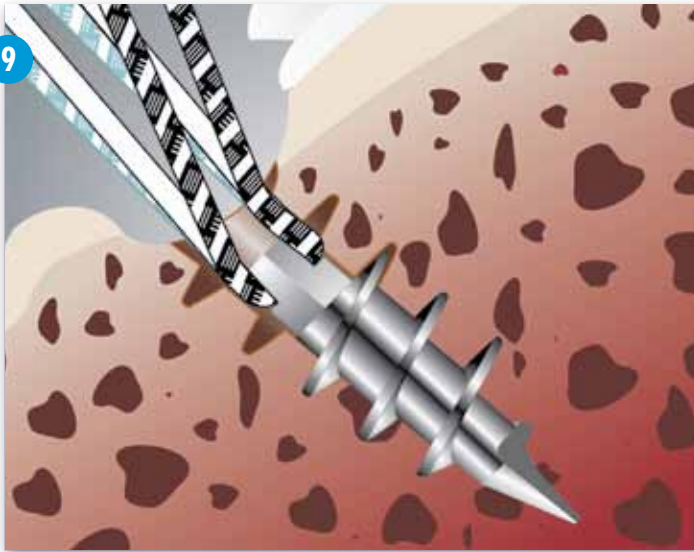
7 Pull the second limb of the suture back through the anterior side of the cuff to finish the "two step" side-to-side suture. Tie the sutures together.



8 Insert the first triple-loaded ThRevo® Suture Anchor a few mm lateral to the articular cartilage at the base of the side-to-side tear. Angle the anchor approximately 45° below the subchondral bone.

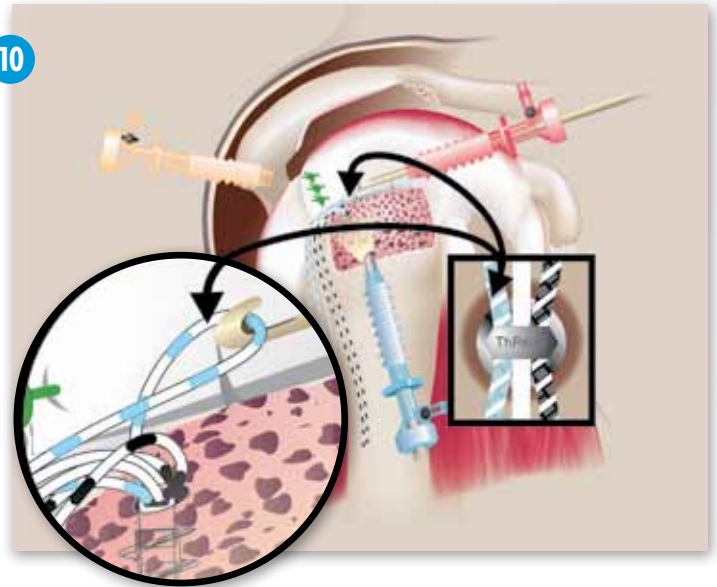
# ThRevo<sup>®</sup> Shoulder Fixation System

## Surgical Technique | Step by Step Rotator Cuff Repair

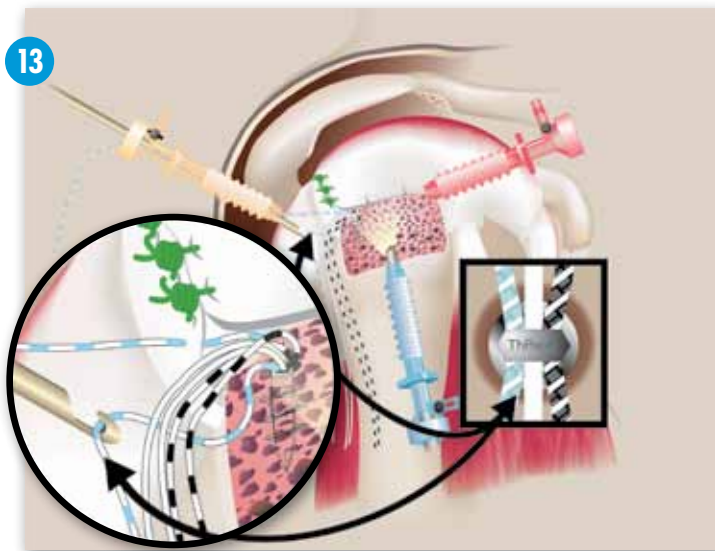


9 Insert the first triple-loaded ThRevo<sup>®</sup> Suture Anchor a few mm lateral to the articular cartilage at the base of the side-to-side tear. (Fig. 8) Angle the anchor approximately 45° below the subchondral bone.

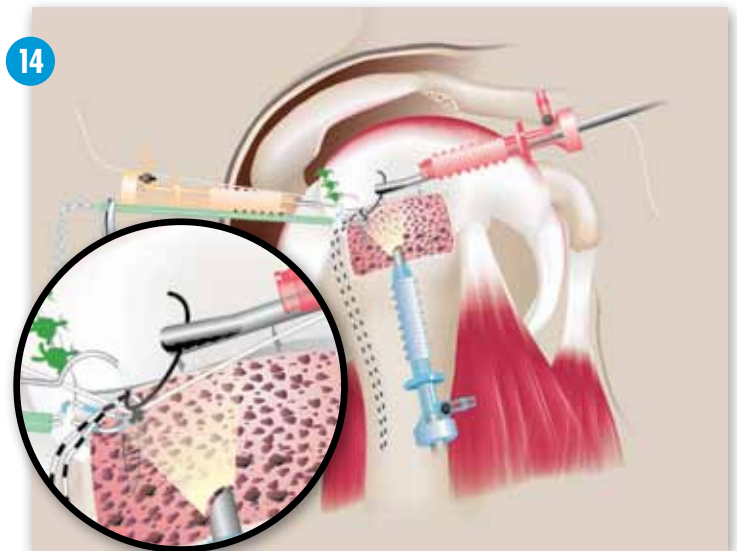
Insure that the eyelet of the anchor is oriented toward the cuff and the horizontal seating line on the driver is just below the cortical surface.



10 Retrieve the most posterior-medial suture (the one exiting the anchor nearest the cuff) and carry it into the anterior Dry-Doc<sup>®</sup> cannula. Be certain to keep from crossing the other sutures.

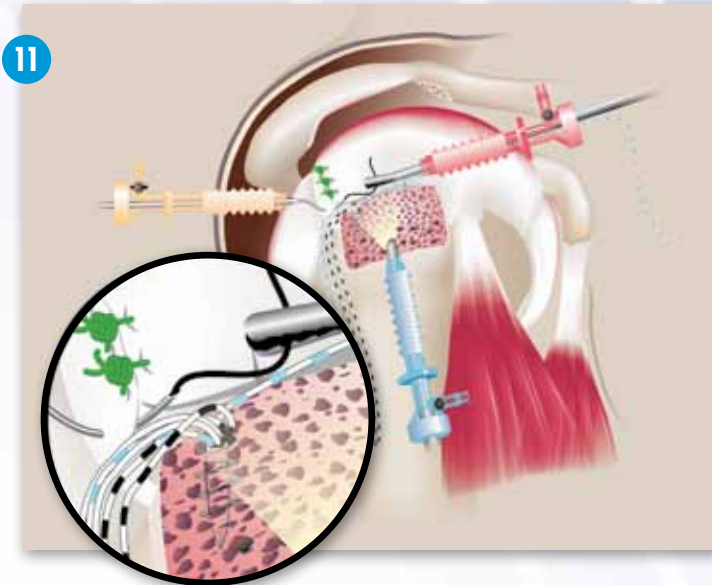


13 Retrieve the partner of the first suture into the posterior Dry-Doc cannula taking care not to cross it with the other sutures.

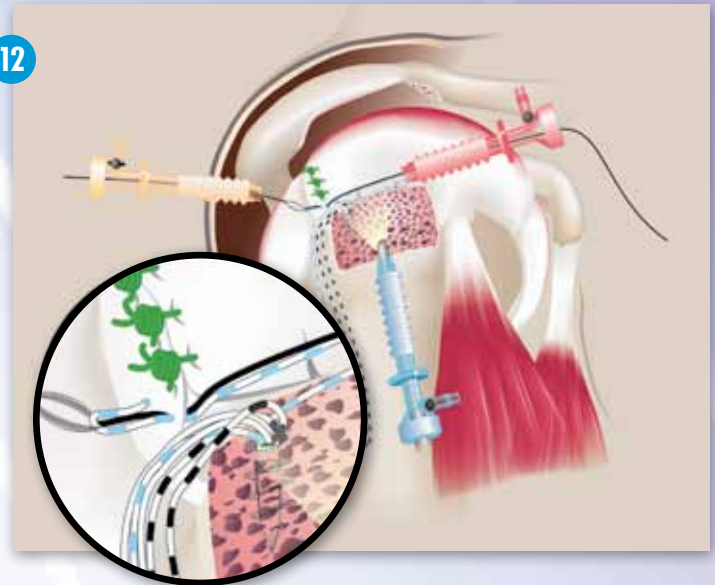


14 Store both of the sutures together in a Green Suture Saver<sup>™</sup> sheath outside the posterior Dry-Doc cannula.

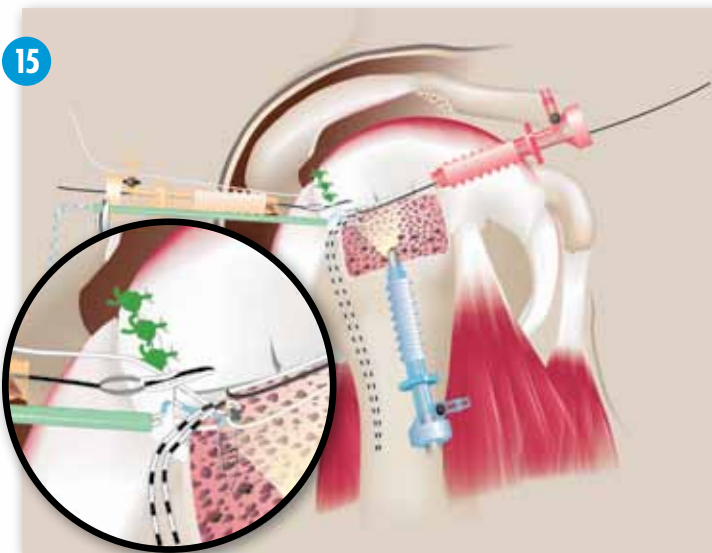
Retrieve the first limb of the middle suture into the anterior cannula. Pass the 45° Spectrum<sup>®</sup> Suture Hook through the cuff on the anterior side of the side-to-side tear and send and retrieve the Shuttle Relay<sup>™</sup> suture passer into the Dry-Doc cannula.



Pass the 45° Suture Hook through the cuff posterior to the side-to-side tear and carry the Shuttle Relay™ out the anterior cannula. Again, be careful to retrieve the Shuttle Relay Suture Passer on the “cuff side” of the other sutures to avoid twists.

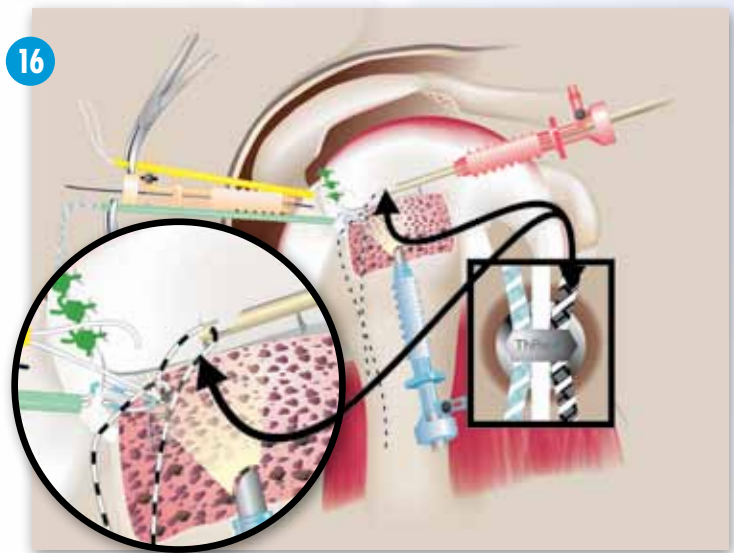


Load the suture into the Shuttle Relay suture passer outside the anterior Dry-Doc® cannula and pull it through the cuff and into the posterior Dry Doc® cannula.



Load the suture in the Shuttle Relay™ suture passer and carry it through the cuff.

Retrieve the second limb of the middle suture and store it in a Yellow Suture Saver™ sheath outside the posterior Dry-Doc cannula.

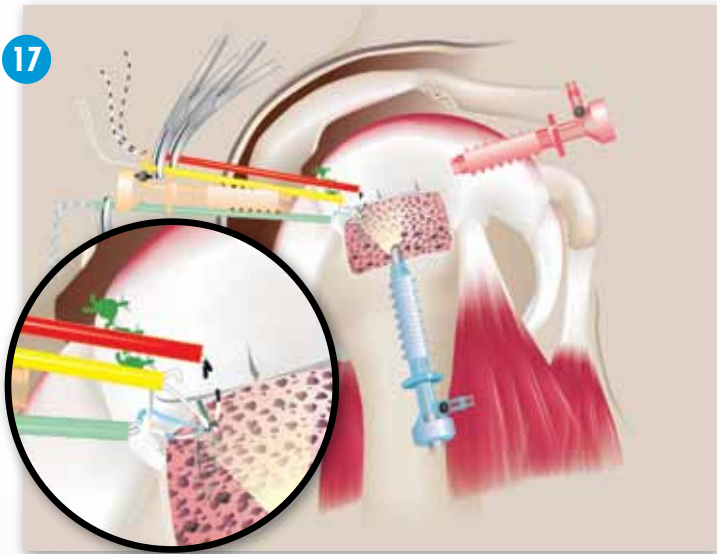


Retrieve the medial limb of the anterior-most suture (the one exiting the anchor away from the cuff) into the anterior Dry-Doc cannula. (Be sure to retrieve it on the cuff side of the other two sutures to avoid twisting).

# ThRevo<sup>®</sup> Shoulder Fixation System

## Surgical Technique | Step by Step Rotator Cuff Repair

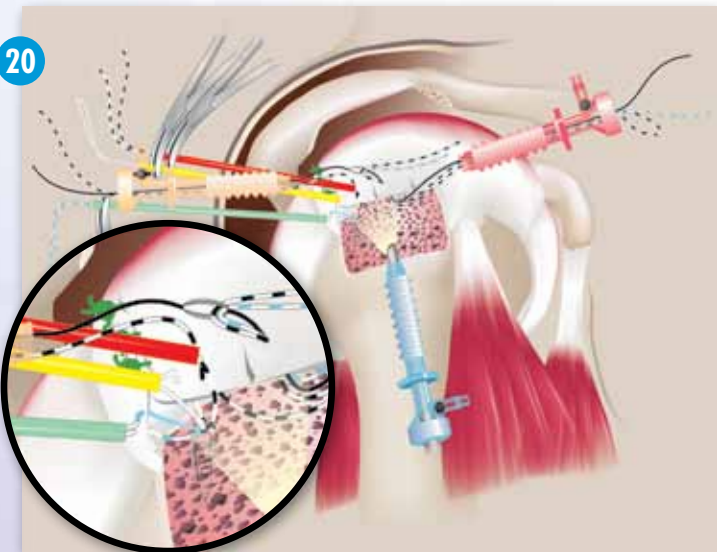
17



\* If the cuff tissue is of poor quality and is degenerative with laminations it is prudent to reinforce the suture line using "rip-stop" stitches. These will close laminations and greatly increase the resistance to pull-through of the anchored sutures.

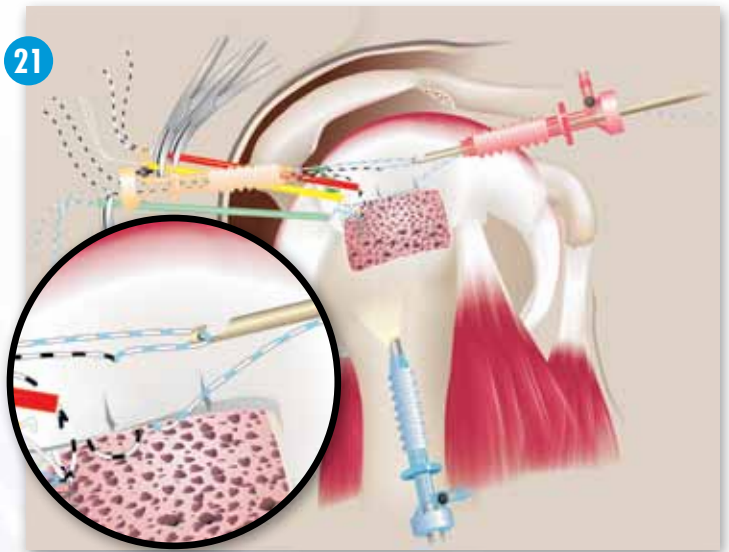
Pass the 45° Spectrum<sup>®</sup> Suture Hook 5mm anterior to the Yellow Suture Saver<sup>™</sup> sheath holding the middle suture and carry the final suture through the cuff to form another simple stitch. Store it in a Red Suture Saver<sup>™</sup> sheath outside the posterior Dry-Doc<sup>®</sup> cannula.

20

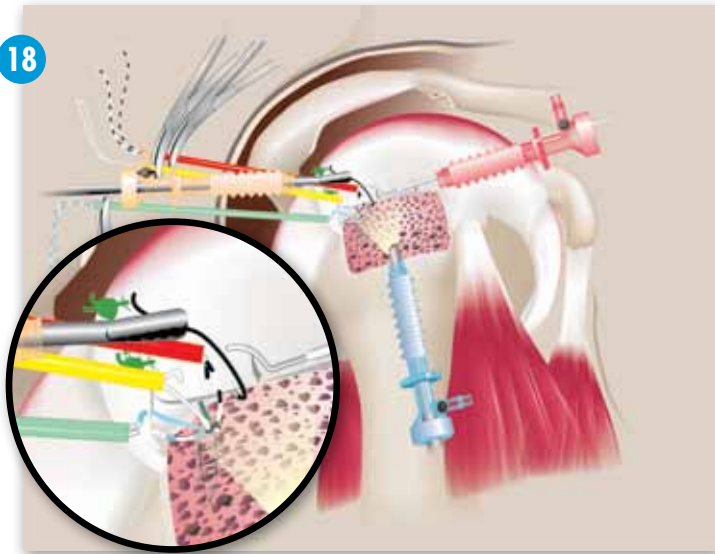


Pass the 45° Spectrum<sup>®</sup> Suture Hook through the cuff end again this time in the midpoint of the tear, retrieve the Shuttle Relay<sup>™</sup> suture passer and carry the remaining end of the first rip-stop suture along with a second suture through the cuff.

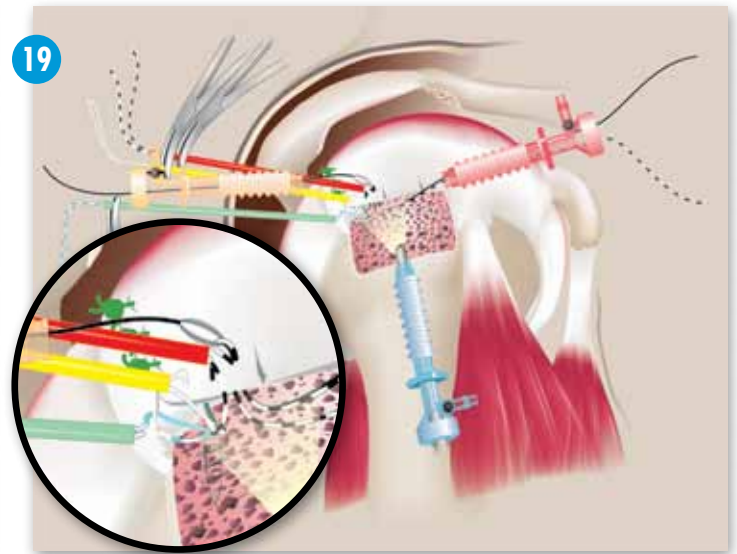
21



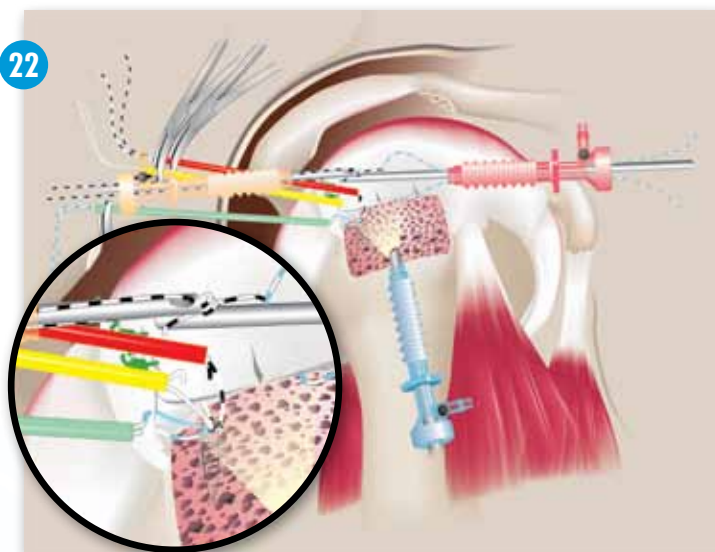
To avoid twisting the two sutures during knot tying. Retrieve the top limb of the second rip-stop suture back out the anterior Dry-Doc cannula using a crochet hook.



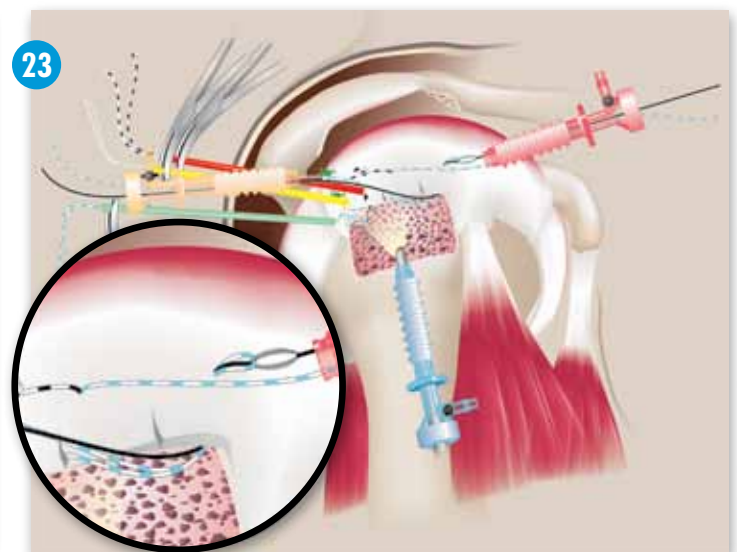
Begin the rip-stop stitch by passing the 45° Spectrum® Suture Hook through the cuff end 1-1.5cm medial at either the anterior or posterior end of the tear. Pass a Shuttle Relay™ suture passer and carry it out the opposite Dry-Doc® cannula.



Carry a strand of braided #2 Hi-Fi® suture back through the cuff using the Shuttle Relay suture passer.



Insert a 2 mm metal "safety" rod through the anterior Dry-Doc cannula passing it under the two limbs of the first rip-stop stitch. Tie the two ends of the rip-stop stitch together with a sliding-locking knot. The rod guards against tying the suture too tightly causing bunching of the tissue.

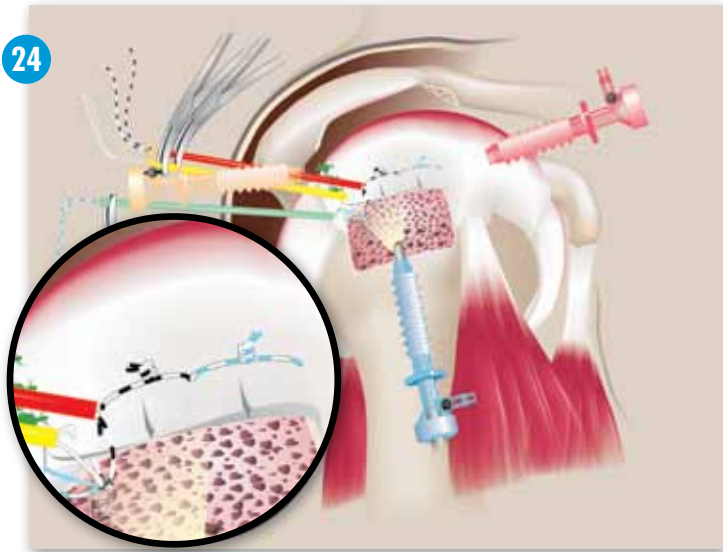


Pass the second limb of the second rip-stop suture through the cuff at the anterior end of the tear and using a 45° Spectrum Suture Hook from the anterior Dry-Doc cannula.

# ThRevo® Shoulder Fixation System

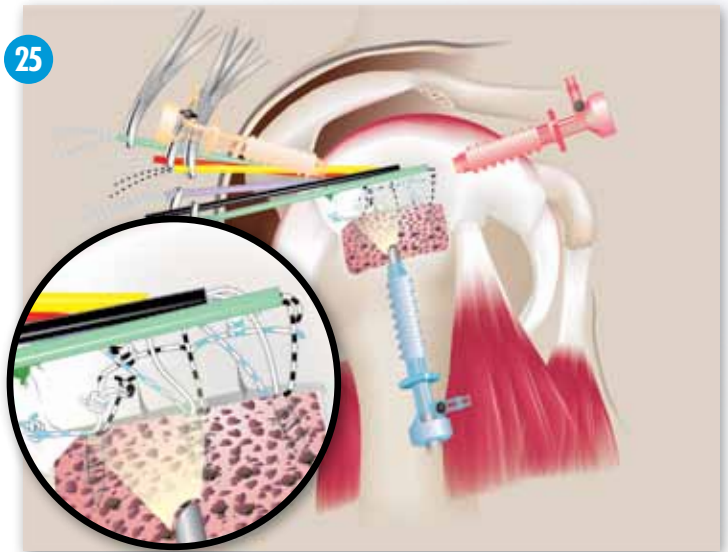
## Surgical Technique | Step by Step Rotator Cuff Repair

24



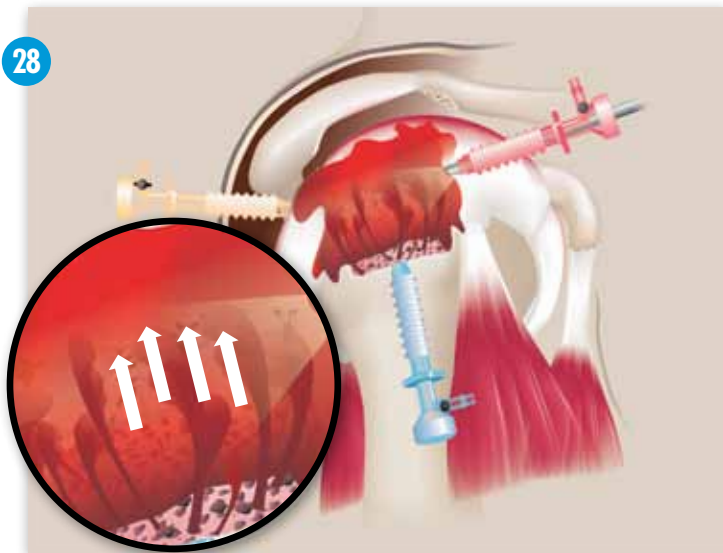
Tie the second rip-stop using the “safety rod” to prevent over tightening. This completes a row of rip-stop sutures that will reinforce the end of the degenerative cuff.

25



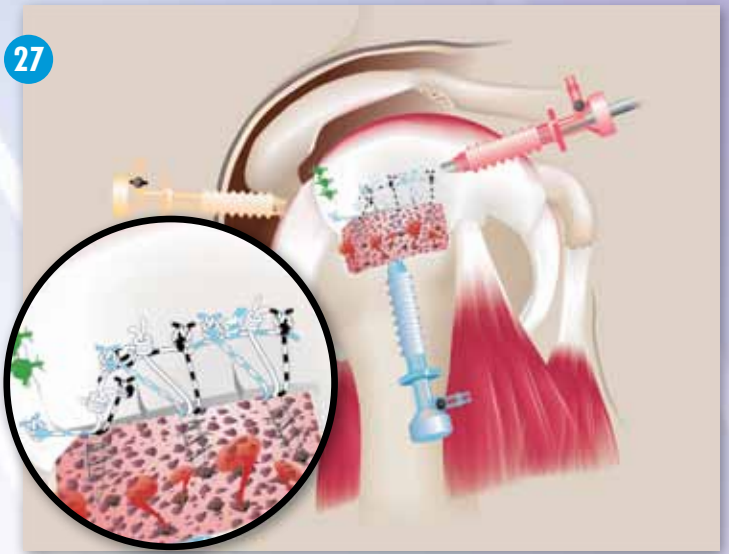
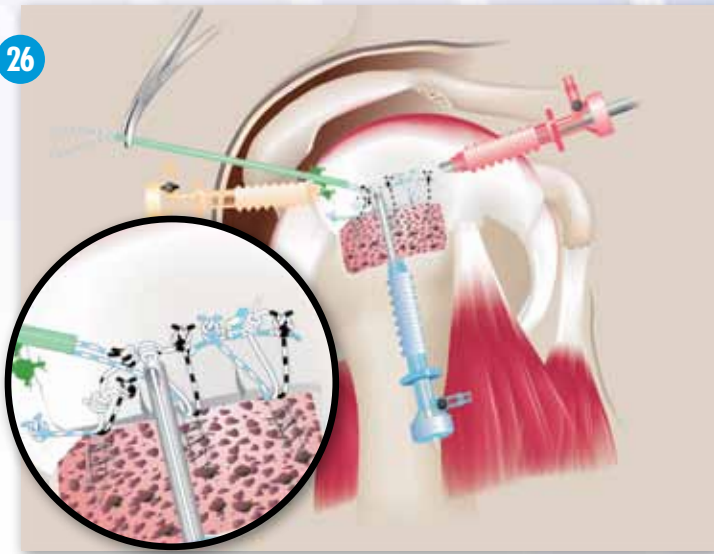
Insert additional ThRevo® anchors into the prepared tuberosity every 1.2 cm working from posterior to anterior. Pass the anchored sutures using the appropriate Spectrum® Suture Hooks through the cuff just medial to the rip-stop stitches. You may choose to use the rip-stop for either two or three of the anchored sutures. Store the sutures in Suture Saver™ sheath outside the posterior Dry-Doc® cannula.

28



Turn off the arthroscopic pump to observe the bone marrow streaming from the tuberosity vents moving up to cover the cuff forming the “Crimson Duvet”.

\* This vital bone marrow blanket supplies stem cells, platelets (with growth factors) and vascular buds all essential to optimize cuff healing.

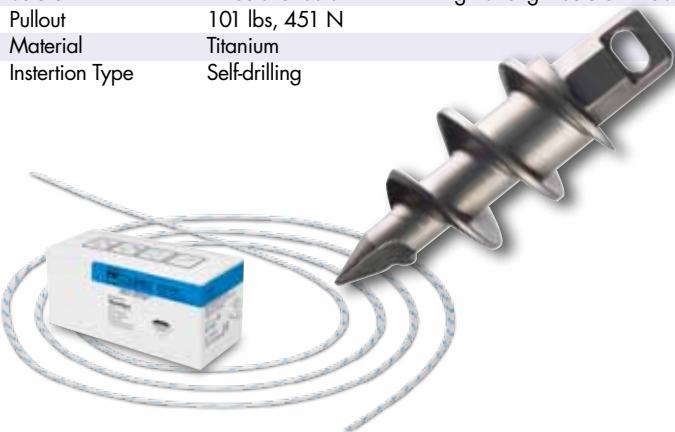


Move the scope into either the anterior or posterior Dry-Doc® cannula and tie the anchored sutures via the lateral portal beginning anterior and progressing posterior.

When all sutures are tied, return the scope to the lateral portal, evaluate the repair.

**ThRevo®**

Diameter	5.0mm
Drill Hole Size	N/A
Suture	Three strands of #2 braided polyester suture C6160
Suture	Three strands of #2 Hi-Fi® High Strength Suture C6160H
Pullout	101 lbs, 451 N
Material	Titanium
Insertion Type	Self-drilling



**Suture Saver™ Kit**

- Helps manage suture pairs prior to knot tying
- Brightly colored for easy visualization
- Can reduce the tissue prior to knot tying
- Compatible with all suture types up to size 2
- 1 kit includes 5 sheaths and 1 threader

**Catalog #**

C6180

**Description**

Suture Saver™ Kit (single-use, 5 kits per box, sterile)



Product Name	Material Description	Suture Size	Catalog Numbers & Info
Hi-Fi®*	100% Ultrahigh molecular weight polyethylene (white color); Ultrahigh molecular weight polyethylene cobraid with mono-filament (white with blue stripes)	#2 #2	H5000- white H5100- double strand pack, white and white w/blue strip box of 12

\* This product contains Dyneema® Purity. Dyneema® Purity is a registered trademark of Royal DSM N.V.

# ThRevo<sup>®</sup> Shoulder Fixation System



## Implant Description

## Cat. No.

ThRevo <sup>®</sup> Suture Anchor, 5.0mm, pre-loaded on a disposable driver ..... (pre-threaded with three #2 Hi-Fi <sup>®</sup> high strength sutures, white, white with black stripes and white with blue stripes)	C6160H
ThRevo Suture Anchor, 5.0mm, pre-loaded, Anchor Only ..... (pre-threaded with three #2 Hi-Fi <sup>®</sup> high strength sutures, white, white with blue stripes and white with black stripes)	C6161H
ThRevo <sup>®</sup> Suture Anchor, 5.0mm, pre-loaded on a disposable driver ..... (pre-threaded with three #2 polyester sutures, green, white with green stripes and white)	C6160

## Suture Passing Instrumentation

Spectrum <sup>®</sup> II Handle.....	C6350
Spectrum II Sterilization Tray.....	C6355
Spectrum II Roller Wheel Replacement Kit .....	C6356
Suture Hook, 45° Right, Limited Reuse .....	C6360
Suture Hook, 45° Left, Limited Reuse .....	C6361
Suture Hook, 60° Right, Limited Reuse .....	C6362
Suture Hook, 60° Left, Limited Reuse .....	C6363
Suture Hook, 90° Right, Limited Reuse .....	C6364
Suture Hook, 90° Left, Limited Reuse .....	C6365
Suture Hook, CorkScrew, Right, Limited Reuse .....	C6366
Suture Hook, CorkScrew, Left, Limited Reuse .....	C6367
Suture Hook, Straight, Limited Reuse.....	C6368
Suture Hook, Crescent, Small, Limited Reuse.....	C6369
Suture Hook, Crescent, Medium, Limited Reuse.....	C6370
Suture Hook, Crescent, Large, Limited Reuse .....	C6371
■ Suture Hook, 45° Right, Sterile, Disposable (Red) .....	C6380
■ Suture Hook, 45° Left, Sterile, Disposable (Blue) .....	C6381
■ Suture Hook, 60° Right, Sterile, Disposable (Orange).....	C6382
■ Suture Hook, 60° Left, Sterile, Disposable (Yellow) .....	C6383
■ Suture Hook, Straight, Sterile, Disposable (Pink).....	C6384
■ Suture Hook, Crescent, Small, Sterile, Disposable (White).....	C6385
■ Suture Hook, Crescent, Medium, Sterile, Disposable (Teal).....	C6386
■ Suture Hook, Crescent, Large, Sterile, Disposable (Purple) .....	C6387

## Spectrum<sup>®</sup> II Accessories:

Spectrum II Sterilization Tray .....	C6355
Slotted Jaw, Suture Punch, 6.0mm needle .....	18.10158
Spectrum II Roller Wheel Replacement Kit.....	C6356
(includes 2 wheels, 2 axles, 1 screw and Allen Wrench)	

## Accessories

Shuttle-Relay <sup>®</sup> Suture Passer (10 per box) .....	C6004
Super Revo <sup>®</sup> Remover Guide .....	C6143
Loop Handle Knot Pusher .....	C6112
Crochet Hook .....	C6105
Katana <sup>™</sup> High Strength Suture Cutter, 4mm Diameter, Straight .....	GU1009
Microscissors, 2.75mm Diameter, Straight .....	2.10011
Grasping Forceps, 3.4mm Diameter, Straight with Ratchet .....	11.1001
Suture Retrieval Forceps, 3.4mm Diameter .....	16.1018
Liberator <sup>™</sup> Knife .....	25.50014
Rasp Liberator <sup>™</sup> Knife.....	25.50016
Suture Saver <sup>™</sup> Kit (5 kits/box) .....	C6180

## CONMED CORPORATION PRODUCT AREAS:

ARTHROSCOPY • ELECTROSURGERY • ENDOSCOPY • ENDOSURGERY • GASTROENTEROLOGY • INTEGRATED SYSTEMS • PATIENT CARE • POWERED INSTRUMENTS • PULMONOLOGY



11311 Concept Boulevard  
 Largo, FL 33773-4908  
 (727) 392-6464  
 Customer Service: 1-800-237-0169  
 FAX: (727) 399-5256  
 International FAX: +1 (727) 397-4540  
 email: customer\_service@linvatec.com  
 www.linvatec.com