

Arthrex® Presents: NEW TECHNOLOGY UPDATE IN HAND & WRIST SURGERY

WINTER 2017

2016 proved to be another exciting year for the hand & wrist team as we've continued to innovate in soft tissue and expand our fracture/fusion options.

The 3.5 DX SwiveLock® SL anchor with InternalBrace™ ligament augmentation has shown remarkable growth, offering ground-breaking solutions for scapholunate, UCL, and CMC pathologies. Fragment specific plating options were added to our wrist plating set to create one of the most comprehensive wrist plating systems on the market today. This combination of soft tissue implants and comprehensive plating options gives Arthrex® the unique ability to tailor solutions to treat some of the most difficult pathologies seen in hand and wrist orthopaedics today.

Our hand & wrist medical education programs continue to expand. With multiple hands-on lab opportunities to learn cutting edge techniques throughout the United States, Arthrex is training more hand and upper extremity surgeons than ever before.

With continued focus and expansion our hand & wrist portfolio is growing rapidly and will continue to do so for many years to come. We look forward to continuous innovation and growth in this exciting market, and we hope you will join us to learn more about the highlights of what is happening at Arthrex. Stay tuned more updates or visit us on our website at www.arthrex.com.

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Back Row (left to right): RJ Choinski, Abigail Freigang, Todd Earhart, Jake Charles, Chris Powell, Scott Peterson, Zachary Day, and Michael Karnes

Front Row: Albert Valdivia, Lindsey Dorrill, Karen Gallen, Adam Garlock, Stephanie Bare, Michelle Morar, Brittany Foslien, Carolyn Brunner and Pete Denove

Fragment Specific Plates

Arthrex is pleased to announce that we have expanded our Wrist Plating System to include a comprehensive selection of fragment specific plates. Along with our extensive volar plate selection, the following plates will be housed within the Wrist Plating System: dorsal plates, L-plates, radial styloid plate, ulnar styloid plate, peri-articular volar hook plate, and wrist spanning plate. Arthrex is committed to giving you the most expansive, all-inclusive set on the market, with emphasis on low profile, variable angle locking plates.



The low profile dorsal plates are available in two width options and offer subchondral support and distal buttressing of dorsal fragments when dorsal plating is indicated. Our periarticular volar hook plate uses tines to reach the most distal fracture fragments that typical screw/plate fixation simply cannot address. The radial styloid plate offers direct radial buttressing and greater stability with a distal screw cluster design, while the ulnar hook plate offers options for distal ulna head fractures with the added benefits of distal tines for further fracture fragment control. Lastly our spanning plating allows a plating option for the more comminuted fracture patterns that require a bridge plating option.

The Arthrex wrist plating system is the all-inclusive plating set that offers options to address even the most complex fractures.



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SCIENTIFIC ARTICLE SPOTLIGHT: INTERNAL BRACE™ REPAIR

Internal Brace Ligament Augmentation for Thumb UCL Repair*

 This biomechanical study compared the maximum load and load at clinical failure of a UCL repair that incorporates a SwiveLock® anchor with InternalBrace augmentation versus a SwiveLock alone.

CONCLUSION: "Inclusion of the *Internal*Brace augmentation significantly increased the maximum load as well as load observed at clinical failure as compared to the SwiveLock alone. Additionally, repairs that included the *Internal*Brace augmentation demonstrated superior maximum loads to previously studied repairs involving either a figure-of-8 tendon weave or Bio-Tenodesis™ screw construct (23.5N and 24.3N, respectively).¹"

¹Whitepaper available on Arthrex.com

Short-to-Medium-Term Outcomes for Mini TightRope CMC Arthritis

- 18 patient study with average 20 month (range, 8-45 month) follow up
- 17 out of 18 patients reported no TMC joint pain on follow up

CONCLUSION: "This surgical technique...achieved pain relief and recreated support for the base of the metacarpal to resit proximal migration or radial deviation. This technique also provided an increase in grip strength and key pinch with return of range of motion early in the postoperative period" (see Table 1).

Roman P, Linnell J. Trapeziectomy Arthroplasty with Sulure Suspension: Short-to-Medium-Term Outcomes from a Single-Surgeon Experience. J Hand Surg Am. 2016;41(1):34-39

- a) SwiveLock repair without Internal Brace ligament augmentation
- b) SwiveLock with Internal Brace ligament augmentation

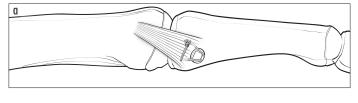




TABLE 1. Comparison of Data Before and After Surgery

	Before Surgery	After Surgery	P Value
Grip strength, kg	17	24	< .001
Key pinch, kg	4.1	4.8	.010
Palmar pinch, kg	3.3	3.8	.210
3-Jaw pinch, kg	3.8	4.4	.130
Thumb abduction (degrees)	56	60	.020

ANCHOR SPOTLIGHT

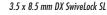


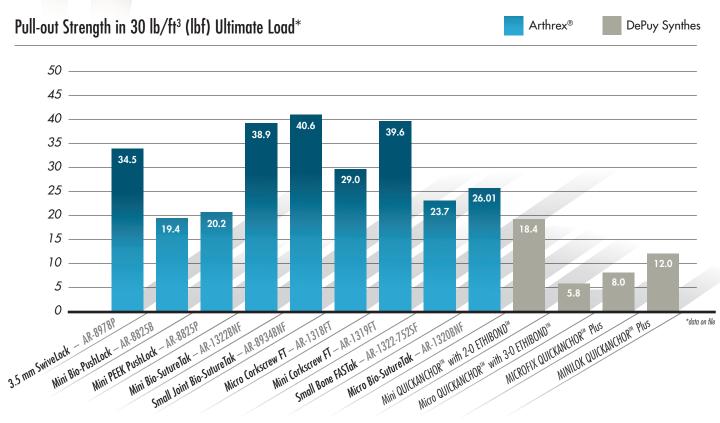
Hand & Wrist Anchors

Innovation in strength, suture and knotless technology*

- Higher pull-out strength compared to competitors*
- Loaded with 4-0 or 2-0 FiberWire® suture
- Knotless repair with the Mini PushLock® or SwiveLock® SL anchors
- Titanium, PEEK, or BioComposite™ material







WHAT'S IN MY BAG?

Internal Brace for Scapholunate Reconstruction*



Steven J. Lee. MD

Q. What made you start incorporating Internal Brace™ ligament augmentation for scapholunate reconstructions?

A. There are probably 20 different ways to treat scapholunate tears and none of them work very well. The reason why so many of them have failed over the years is that the tendon graft stretches out and the fixation is weak. The idea of the *InternalBrace* is to fortify the biologic reconstruction with suture so that there is immediate stability while the graft incorporates.

Q. You have described two different techniques for scapholunate. Why did you add the interosseous technique and how often do you use it?

A. a.) If any of the volar ligament is still intact, I will do the dorsal reconstruction. Those do reliably well. The ones that seemed to have failed in the beginning were the tears where all three components of the ligament were torn. Marrying that concept with the fact that people liked the idea of being center on the bone like the SLAM or the RASL procedure, the idea for an interosseous InternalBrace reconstruction was born. Basically, the key is to keep the bones together while restricting any volar gapping, or an open book situation. Most importantly, the interosseous technique differs from the SLAM and the RASL procedures because it also controls for rotation. The limbs of the graft and the suture come up through the lunate dorsally and then attach to the distal pole of the scaphoid. This controls scaphoid flexion and lunate extension.

b.) The question of how often I use one technique over the other is difficult to answer. It would probably be around 50/50 at the moment. The decision on whether to choose one technique over the other is often done intraoperatively. Again, if all three components of the S-L ligament are torn, I'll perform the interosseous technique. If any portion of the volar portion of the S-L ligament is intact, I will do the Dorsal reconstruction technique.

Q. Have you considered just using SutureTape™ suture vs. SutureTape with a graft?

A. I think the concept of having the biologic component integrated into the reconstruction is still important. Unlike a basal joint where you have the biological arthroplasty because of the hematoma formation, the scapholunate still requires strength over time. For example, with those techniques that utilize a non-biologic reconstruction, you see those often fail and I think the key to success is to have the strength of the suture combined with the graft that will incorporate and stand the test of time.

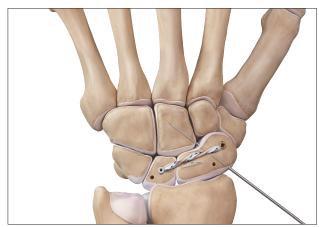
Q. What is your post-op protocol for this procedure?*

A. I pin the scaphocapitate joint for 6-8 weeks and immobilize them in either a cast or splint during that time. Then hand therapy is started, but I avoid strenuous use of the wrist until 12 weeks depending on comfort level.

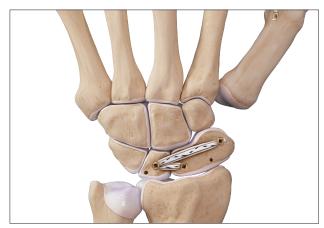
*Post-op protocol is patient and surgeon dependent

Q. Why do you continue to pin the scaphocapitate joint when it seems like the repair is rock solid?

A. This is as close to an anatomical reconstruction as I have found, but it is still not completely anatomic and there are secondary stabilizers that are not being addressed. If you make the assumption that the radio-scapho-capitate ligament is still a big component of this injury, we are not addressing that. Pinning this would allow the secondary and tertiary stabilizers to heal. As to the question about why I place my pins from scaphoid to capitate, all I need to do is control the relationship of the bones. If I put a scapholunate shot in, there is potential for it to disrupt my graft and suture reconstruction. Since there is minimal space in these bones, placing the K-wire from the waist of the scaphoid into the capitate has been the most reproducible option.



Interosseous Scapholunate Reconstruction



All Dorsal Scapholunate Reconstruction

The views expressed in this handout reflect the experience and the opinions of the presenting surgeons and do not necessarily reflect those of Arthrex, Inc. This is not medical advice and Arthrex recommends that surgeons be trained in the use of any particular product before using it in surgery. A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. A surgeon must always refer to the package insert, product label and/or instructions for use before using any Arthrex product. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Arthrex representative if you have questions about availability of products in your area. The views expressed in this brochure reflect the experience and opinions of the presenting surgeons and do not necessarily reflect those of Arthrex, Inc.

WHAT'S IN MY BAG?

InternalBrace for UCL repair*



Steven S. Shin, MI

- Q. InternalBrace™ ligament augmentation is a new hot topic in Hand & Wrist, as well as the rest of the body. How did you become interested in the technology and when did you start using it?
- A. Over the past couple of years, I've been looking for ways to avoid or limit the use of post-operative casts and pins after hand and wrist surgery. Although this was particularly important for my elite athlete patients, I knew this could also be very beneficial for my everyday patients. I had heard of *Internal*Brace technology being used for the larger joints and I felt that it could be significant for certain hand and wrist conditions.
- Q. You have described accelerated rehab protocols for both thumb UCL repairs and reconstructions. How has this changed your practice and your patients' outlook about surgery?*
- A. I began using InternalBrace technology for my thumb collateral ligament repairs and this has totally changed the game in regards to post-operative rehab and return to work/play. Rather than casting the thumb for a month following the surgery, the patient with InternalBrace augmentation can begin moving within a week after the surgery, thus accelerating their return to activity. I've also used it for my thumb UCL reconstructions; rather than the typical 6-8 weeks of post-operative immobilization, I've cut that in half, down to 3-4 weeks. My patients have benefited significantly from this decreased time in a cast and they are happier because of this. And, most importantly, the repairs and reconstructions have held up very well, with no recurrent laxity.
 - *Post-op protocol is patient and surgeon dependent

Q. Have you considered using just SutureTape™ suture instead of SutureTape combined with a biologic repair?

A. For my acute ligament tears, I will add the InternalBrace augmentation to a typical FiberWire® suture repair. I've been using SutureTape now for the InternalBrace which is only slightly smaller than LabralTape™ but still strong. I've found that InternalBrace augmentation is especially useful for subacute or chronic tears, where the ligament quality may not be ideal but "good enough" to repair. The InternalBrace augmentation adds that extra required strength to the repair and can obviate the need for reconstruction with a tendon graft.

Although I have definitely considered using SutureTape alone for my repairs due to its strength, my preference is currently to perform reconstructions using a tendon graft as the biologic component. That said, I have some experience using SutureTape alone for scapholunate ligament reconstructions and have been quite happy with how well these have done so far.

Q. Where else would you consider using Internal Brace in the hand

A. Besides the thumb UCL, I've also used the InternalBrace for thumb RCL injuries and non-thumb CMC joint dislocations with very good outcomes, including in professional athletes. I plan on using the InternalBrace for hyperextension deformities of the thumb MCP joint secondary to CMC joint osteoarthritis, which is a common finding. I can see the *Internal*Brace used for non-thumb MCP joint collateral ligament injuries as well, especially for chronic injuries where using a tendon graft may be avoided if an *Internal*Brace is used.

Arthrex® is currently developing an implant for *Internal*Brace augmentation in the small joints of the hand, e.g. the PIP joints and smaller MCP joints, where collateral ligament and volar plate injuries are common and can lead to laxity and deformity, e.g. PIP joint hyperextension in swan neck fingers. I truly believe that *Internal*Brace technology will significantly improve patient satisfaction and outcomes for numerous conditions of the hand and wrist.



UCL Repair



UCL Reconstruction

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WHAT'S IN MY BAG?

Internal Brace™ Ligament Augmentation Repair for CMC Arthritis*





David Tuckman, MD

Andrew Greenberg, MI

- Q. You have performed different techniques throughout the years for CMC arthritis. How has that evolved and why has *Internal*Brace been a game-changer?
- A. Dr. Tuckman and I both started with simple trapeziectomy, suspended with a pin. This evolved to an LRTI, where the FCR was used as an autologous graft. We further experimented with your TightRope® suture system when it was developed.

The Internal Brace evolution has changed both of our practices. Studies show that regardless of the procedure, the results of all forms of basal joint arthroplasty are comparable. For that reason, our goal is to maintain the suspension of the first metacarpal for, at least, the time that the pin would have been in place for a trapeziectomy or LRTI.

The InternalBrace allows us to perform a simple trapeziectomy, confer the stability of a ligament reconstruction, and do this through only one incision with no need for a pin or a cast. The speed of the surgery has greatly increased as there is no tendon harvest as with LRTI, no need for perfect pin placement as with the TightRope, and no tensioning difficulties. Lastly, no bridges are burned. You still have your FCR, APL, and the ability to place a TightRope, all as revision measures if need be.

- Q. Dr. Steven J. Lee originally described this technique using an APL graft coupled with SutureTape™. You have gone a step further and are just using SutureTape to suspend. Can you speak to why you made that change in your technique?
- A. We changed the use of the APL because the strip required to fit into the tip of the SwiveLock® anchor is very small. We do not believe that this small strip of tendon is providing any useful support or subsequent "biologic" reconstruction. Moreover, as written above, the results of all forms of basal joint arthroplasty, both with and without grafts, are the same. Therefore, we can suspend with the *Internal*Brace alone until a hematoma and scar has formed in the previous trapezium bed, while avoiding the potential for donor site morbidity.
- Q. Are there any tips and pearls that you have found to make this surgery even more reproducible?
- A. The key tip would be to place the first metacarpal guide wire at the most radial part of the articular cartilage, equal on the dorsal/volar axis. This will allow for true suspension and aid in tensioning. Furthermore, all tensioning should be done in full adduction to prevent impingement.

Q. What is your post-op protocol?

- A. Post-op protocol is a splint the day of surgery, thumb spica. At one week, wound is checked and often dissolvable sutures are used. The patient goes that day to an OT for a custom fabricated forearm based thumb spica brace with free IP to be worn at all times except for therapy and for showering. Therapy is active and passive thumb IP motion and MP motion. No CMC motion and no strengthening or resistance. No weight bearing and no pinching even with the brace on. Pinch and weightbearing begin at 50% week 6 and moves to unrestricted at week 10.
 - *Post-op protocol is patient and surgeon dependent



NEW PRODUCTS

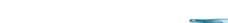
Fragment Specific Plating

The Wrist Plating System provides a comprehensive solution for distal radius fracture management. Multiple plating options include a comprehensive volar plate selection, as well as dorsal plates, radial styloid plate, peri-articular plates, L-plates, ulnar styloid plate, and a dorsal spanning plate.

Radial Column Plates:

Radial Styloid plate L-Plates Dorsal plates Spanning plate

Intermediate Column



Spanning Plate

0000





Radial Styloid Plate





Ulnar Styloid Plate

Plates:

Dorsal plates Spanning plate Peri-Articular Volar Hook plate



Volar Hook Plate AR-8916VH



Dorsal Distal Radius Plate AR-8916DSL



Dorsal L-Plate AR-8952ML

Ulnar Styloid Plate

AR-8956-01



Ulnar Column Plate:

Ulnar Styloid plate

Radial Styloid Plate AR-8916RSTY



Spanning Plate AR-8916SPN

NEW PRODUCTS

3.5 mm DX SwiveLock SL

Internal Brace™ Ligament Augmentation with the 3.5 DX SwiveLock® SL Anchor

By far the most exciting new technology in the hand and wrist, *Internal*Brace with SutureTape™ suture offers the benefit of immediate stability while the biologic repair or reconstruction heals. The DX SwiveLock SL has been available for over a year, and results have been excellent. This spring the first round of scientific write-ups will be published, and we look forward to following these exciting techniques.

Select Indications

All-Dorsal ScaphoLunate Reconstruction with *Internal*Brace Ligament Augmentation

This technique is done through one incision and is meant for acute or chronic tears where the dorsal and central portions of the S-L ligament are torn. A slip of the ECRB is harvested, and, along with SutureTape, the graft is placed into the proximal pole of the scaphoid, brought over to the lunate, and then brought distally to the distal pole of the scaphoid. Both scapholunate reconstructions require an anti-rotational k-wire to be placed from scaphoid to capitate for 6 weeks to allow for healing.

Interosseous ScaphoLunate Reconstruction with *Internal*Brace Ligament Augmentation

This technique is also performed through a single incision and is meant for acute or chronic tears where the entire S-L ligament is torn. A slip of the ECRB tendon is inserted into the central portion of the scaphoid, then brought up through a tunnel in the lunate, and finally secured dorsally into the distal pole of the scaphoid.

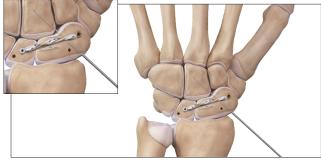
Thumb UCL Repair with Internal Brace Ligament Augmentation

The DX SwiveLock is loaded with a strand of 2-0 or 3-0 FiberWire® suture (according to surgeon preference) and a strand of SutureTape. The SwiveLock is placed into the proximal phalanx, and the remaining ligament is repaired with the strand of FiberWire. Once the primary repair is finished, the thumb is placed in 30 degrees of flexion, and the strand of SutureTape is brought over the repair and secured into a second SwiveLock just proximal to the origin of the UCL ligament on the first metacarpal.

APL Suspensionplasty with Internal Brace Ligament Augmentation

A slip of the APL tendon is harvested and whipstitched with 2-0 FiberLoop® suture on both sides. The graft and a strand of SutureTape are then loaded onto the DX SwiveLock. The SwiveLock construct is then inserted onto the proximal, radial corner of the thumb metacarpal base. A second SwiveLock brings the graft and SutureTape into the base of the second metacarpal, creating a hammock-type suspension under the first metacarpal.







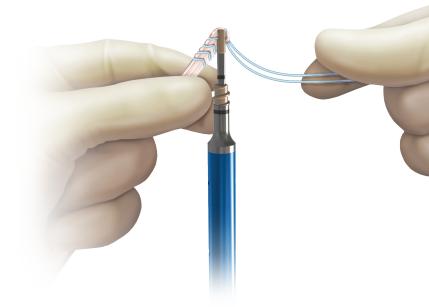


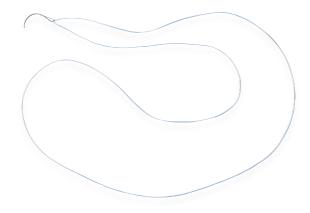
SURGICAL TIPS AND PEARLS

1. *Internal*Brace[™] Tendon Graft Sizing

Graft size is crucial when using the 3.5 mm DX SwiveLock® SL anchor. When incorporating SutureTape™ suture or LabraTape™ suture, the graft must be between 2.0 and 2.5 mm in width. Generally, a slip of the ECRB or the Palmaris will be appropriately sized for the forked tip of the anchor.

When the graft is oversized, the threaded anchor cannot catch the surrounding bone and fixation is compromised.





2. Hand & Wrist-Specific 2-0 and 4-0 FiberLoop

Arthrex® has several FiberLoop® suture products that are specifically designed for smaller grafts used in hand surgery.

2-0 FiberLoop with taper needle AR-7232-05
4-0 FiberLoop with taper needle AR-7229-20
4-0 FiberLoop with taper needle (short loop) AR-7229-12

3. Trapeziectomy Tool

The Arthrex Trapeziectomy tool allows the surgeon to quickly grab the trapezium and then use the handle as a joystick while releasing soft tissue around the bone. This tool can also be used for bone excisions in the carpus.

The tool is included in the CMC Mini TightRope® suture convenience kit (AR-8919DS) or can be ordered sterile in a single pack (AR-8919-01S).



DISTAL EXTREMITIES EDUCATION

The evolution of our hand & wrist line during this last year has made a significant impact improving the quality of care for these patients. Hand surgeons now have the ability to increase their armamentarium incorporating our recently developed arthroscopic and minimally invasive cutting edge techniques. Our trauma solutions combined with safe, fast and reproducible surgical means to repair, augment, and reconstruct ligamentous structures are constantly showcased at national and international meetings. We in medical education have also developed and enhanced our educational programs to keep up with this rapid growth; including single-day labs working one-on-one with one of our clinical experts, dynamic courses for surgeons-in-practice with engaging open floor discussions, live cadaveric demonstrations, expert panels, and our Annual North American Hand & Wrist Fellowship Symposium.

The 2016 North American Hand & Wrist Fellows Symposium was successfully held in Naples on May 13th and 14th with 48 Fellows in attendance. This was a great educational event with the opportunity to learn on advanced techniques such as InternalBrace™ ligament augmentation procedures (scapholunate, thumb UCL, and thumb CMC), Mini TightRope® thumb CMC suspensionplasty, and the ulnar tunnel TFCC repair among many others. The faculty for this second-to-none symposium was assembled with world renowned surgeons including Lee Osterman, MD, Steve J. Lee, MD, Damon Adamany, MD, Andrea Atzei, MD, Sanj Kakar, MD, Jerry Huang, MD, and Steve Shin, MD. We successfully held another fellows course in Los Angeles, CA on June 11th and 12th with participation of 9 surgeons-in-training from programs based in the West Coast. Our 2017 North American Hand & Wrist Fellows Symposium will be held in Naples on May 5th and 6th with a new optional shoulder track on May 4th.



*The InternalBrace surgical technique is intended only to augment the primary repair/reconstruction by expanding the area of tissue approximation during the healing period and is not intended as a replacement for the native ligament. The InternalBrace technique is for use during soft tissue-to-bone fixation procedures and is not cleared for bone-to-bone fixation.

On Friday September 30, 2016 we held our workshop on *Internal*Brace technology using our new 3.5 mm ForkedTip SwiveLock® anchor for scaphoLunate and thumb UCL pathologies at the ASSH Annual Meeting in Austin, TX. Steven J. Lee, M.D. and Steven S. Shin, M.D. instructed 80 surgeons at this session. We conducted a series of educational workshops on *Internal*Brace applications in the Hand & Wrist" in Dallas, TX, Atlanta, GA, and New York, NY with an average participation of 10 surgeons per session. We also had the opportunity to conduct three hand & wrist courses for the Latin American region (two in Sao Paulo, Brazil, and one in Miami, Florida)

We actively participated at the recent Triennial International Federation of Societies for Surgery of the Hand (IFSSH) in Buenos Aires, Argentina from October 24th through the 28th. We had the opportunity to give four podium presentations discussing the benefits of our techniques for arthroscopic TFCC repair, PIP injuries, carpal instabilities, and flexor tendon repair. Various surgeons from all over the world shared their experience with the use of the thumb CMC Mini TightRope and tenodesis fixation.

This has been an exemplary year in hand & wrist for our medical education Department, and we look forward to an outstanding 2017-2018! We would like to extend our sincere gratitude and appreciation to our consultants and surgeon instructors. Your hard work and dedication improves surgeon's ability to extend our Arthrex® mission of Helping Surgeons Treat Their Patients Better™.

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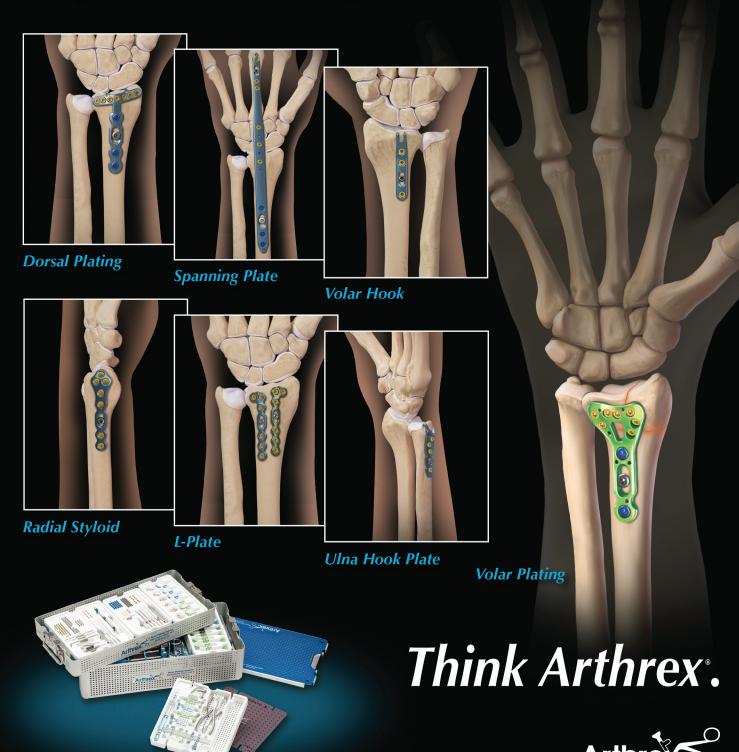
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Need Options for your Wrist Fracture?

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AD1-00106-FN A

Comprehensive Wrist Plating Solutions in One Set



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