Welcome to the ACFAS Annual Meeting in San Antonio. Arthrex remains committed to servicing all of your metal, soft-tissue, trauma, and arthroscopic solutions for foot and ankle pathologies. The innovation process never stops at Arthrex. Take special note of our new Mini CFS System, the most comprehensive mini fragment repair system on the market today. We have also launched our new line of minimally invasive ankle fusion plates, as well as advancing technologies in MIS forefoot surgery. Finally, our recently released NanoScope™ operative arthroscopy system will completely change orthopedic arthroscopic visualization as we know it. Come to our exhibit and meet our staff of product managers and engineers, all here to help you experience what we can offer in support of our mission of Helping Surgeons Treat their Patients Better™. Courses and information are listed on our website. We hope to see you in Naples soon so you can experience the best medical education programs in our new state-of-the-art facilities. Thanks for your continued support and have a great meeting in San Antonio.

Pete Denove
Senior Director, Product Management

Internal/Brace™ Ligament Augmentation

- Surgical versatility - more size/material options
- Talus offset guide - reproducible anatomic placement
- Radiopaque marker and laser-line window on SwiveLock™ driver
- Biologically advantageous - collagen-coated FiberTape® suture and JumpStart® antimicrobial dressing

MIS Ankle Fusion Plating System

Small Footprint, Huge Impact

The titanium Ankle Fusion Plating System provides a complete solution for ankle fusion management with a comprehensive offering of anatomy-specific plates available for both tibiotalar and tibiotalocalcaneal arthrodeses. With 7.0 mm Compression FT screws and the new Minimally Invasive Ankle Fusion Plate, you now have a “mini open” option to approaching anterior tibiotalar arthrodesis. Compared to the standard 3-screw fusion construct, the addition of an anterior plate increases construct rigidity and decreases micromotion at the ankle fusion interface without the need for a standard open incision.

Reference

DynaNite® PIP Hammertoe Implant

Next-Generation Hammertoe Correction

The PIP DynaNite hammertoe implant is the only threaded, cannulated Nitinol implant on the market. The implant barbs are extended by inserting a K-wire and cannulation allows surgeons to cross the MTP joint with the K-wire if desired. Implants are offered in 12 mm, 14 mm, and 16 mm sizes (lengths and widths increase proportionally with straight and bent implants).
Mini Plates...Big Solutions

The Mini Comprehensive Fixation System consists of 1.4 mm, 1.6 mm, 2.0 mm, and 2.4 mm titanium, variable-angle locking, low-profile plates designed for osteotomies, fusions, and fractures of small bones.

Features and Benefits
- 56 Plating Options
- Universal Straight, T-, Wide T-, V-, and Y-Plates
- Reinforced Straight and T-Plates
- Unique Bridge, Cage, and Triangle Plates
- Variable-Angle Locking Holes
- Compression Holes
- 1.0 mm*/1.4 mm/1.6 mm/2.0 mm/2.4 mm Screws
- Color-Coded Modules With Intuitive Instrumentation
- Curved Plate Cutter
- Superior Screw Holding Sleeve

*FDA clearance pending
Mini CFS
Mini Comprehensive Fixation System
1.4 mm/1.6 mm/2.0 mm/2.4 mm

Comprehensive Plating Options

- **Z-Plate**
  1.4 mm/1.6 mm

- **Hook Plate**
  1.4 mm/1.6 mm

- **Cage Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Bridge Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **T-Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Straight Plate, Reinforced**
  2.0 mm/2.4 mm

- **Straight Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Triangle Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Y-Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Rotation Correction Plate**
  1.6 mm/2.0 mm/2.4 mm

- **Wide T-Plate**
  2.0 mm/2.4 mm

- **V-Plate**
  2.0 mm/2.4 mm

- **Bridge Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

- **Straight Plate**
  1.4 mm/1.6 mm/2.0 mm/2.4 mm

Corresponding Screw Fixation

- **Low Profile Screw, Cortical, Titanium**
  1.0 mm*: 6 mm-14 mm
  1.4 mm: 6 mm-16 mm
  1.6 mm: 6 mm-24 mm
  2.0 mm/2.4 mm: 6 mm-40 mm

- **Micro Compression FT™ Screw**
  2.5 mm – Optional caddy for intramedullary fixation
  36 mm-50 mm (4 mm increments)

- **Variable-Angle Locking Screw**
  1.4 mm: 6 mm-16 mm
  1.6 mm: 6 mm-24 mm
  2.0 mm/2.4 mm: 6 mm-40 mm

- **Mini Compression FT™ Screw**
  3.5 mm – Optional caddy for intramedullary fixation
  36 mm-50 mm (4 mm increments)

*FDA clearance pending
Q. How many MIS bunion procedures have you performed to date?

A. I have been performing MIS techniques since I started practice after fellowship in 2012; these included digits, tarsal bones, hindfoot bones, ankle, and obviously bunions. I have performed 400+ MIS procedures, of which over half are hallux valgus.

Q. How many cases did it take for you to feel 100% confident in the technique?

A. I started out with the first- and second-generation techniques that were not specifically designed for MIS, so it took a few cases (<5) to get comfortable with the instrumentation and setup. I think for those that start out with this method it will take around 5 to 10 cases to start getting comfortable with all aspects, which includes the setup, the instrumentation, C-arm placement, hand positioning, and postoperative care.

Q. What differences have you noticed between the second-generation bunion techniques with the K-wire versus your transition to the third-generation bunion techniques with internal fixation?

A. The most apparent differences are all related to the pin; there is no pin to manage. With an exposed pin, the patient has anxiety about bumping or pulling it out. For the surgeon, those worries, along with developing a pin tract soft-tissue infection/irritation, are constant concerns for 4 weeks until the pin is removed. In our paper, which was recently published in *JFAS*, we had a 19% pin site skin infection rate.¹ Though none went to deep infection, it can be a concern when starting a new method. The all-internal fixation method significantly reduces patient concerns and decreases the likelihood of a soft-tissue infection. For surgeons new to the technique, it will give them the "peace of mind" that internal fixation is in place versus a Steinman pin.

Q. What is your average operative time with the third-generation MIS bunion technique?

A. On average, I would say it is about 15 minutes. Though I want to say to those that start with these methods that there are some caveats; I've been doing this a long time and I have a team of nurses and techs that are used to my preferences. New surgeons should expect to take longer in the beginning and the time will automatically decrease as they gain comfort and proficiency.

Q. How large of a shift of the metatarsal are you able to obtain with the MIS techniques?

A. My goal is typically to shift 75% to 90% of the width of the metatarsal.

Q. Have you had any issues with nonunions or instability after the large shifts, especially considering the transverse osteotomy?

A. Our paper, which is the first in North America, demonstrated zero nonunions with the transverse cut.¹ I have not had any nonunions so far in over 200+ cases.

Q. What advice would you give to a new MIS bunion surgeon to help get them over the initial learning curve?

A. The most important piece of advice is to not modify the technique. That means: do not modify the method of the cut, the method of the translation, and definitely do not modify the placement and manner of fixation. Your X-rays should look the way Arthrex recommends at their courses when you’re done. The individuals that I know who had some challenges always had a modification of the technique. With internal fixation I think two screws for the metatarsal osteotomy along with an Akin osteotomy with fixation are important.

References


Q. What technique pitfalls should be avoided?

A. The three most common pitfalls I see are as follows:

1. A lack of adequate final translation and rotation due to fear of stability. Adequate translation and rotation will ensure ease of fixation with bony contact of the proximal and distal segments and correction of the sesamoid apparatus.

2. Not performing an Akin for the MIS bunion repair is a common mistake. Hallux valgus is an intermetatarsal and hallux deformity. Since no ancillary soft-tissue procedures are performed via the MIS technique, the Akin helps realign the extensor and flexor tendons along with providing a better clinical appearance.

3. Only using one screw for the fixation of the metatarsal osteotomy. Though the FT screws are strong, one screw will not resist the rotational forces on the metatarsal head given the aggressive post-op recovery regimen of immediate weightbearing and shoe gear at 4 weeks. I think this can lead to loss of correction and also create instability of the capital fragment.

Q. Could you please describe your post-op protocol for MIS bunion corrections?

A. My protocol is very simple:

1. Rigid flat post-op shoe for 4 weeks for all flat weightbearing activity

2. Transition to stable sneaker and passive ROM exercises of the MTP joint with full weightbearing at post-op week 4

3. Light exercise at 8 weeks

4. Impact activity and sports at 10 to 12 weeks (kids tend to do this closer to 8 to 10 weeks)

Q. What differences have you seen regarding patient-reported outcomes when comparing open to MIS bunion surgery?

A. We are in the process of collecting our outcomes for publication, but subjectively, there is vastly greater satisfaction with the MIS method compared to open procedures. Anecdotally, I have also noticed less narcotic use and an earlier transition to over-the-counter pain medications (within 1 to 2 weeks) compared to open methods.
Case Review
DynaNite® PIP Hammertoe Implant

Q. What are the key features you like about the new DynaNite PIP implant for hammertoes?

A. Murray Butler (MB): I love that the implant threads into the less reliable, smaller middle phalanx. In combination with the superelasticity and shape memory of the Nitinol prongs in the proximal phalanx, I feel confident in the reproducible nature of the implant construct and its ability to maintain compression of such a small joint despite small variations in patient anatomy. The Nitinol implant is really a selling point for me. It adapts if osteolysis begins to occur so that bone purchase in the proximal phalanx is not lost, and the ability to allow for some controlled micromotion at the arthrodesis site should improve bony consolidation but maintain the ultimately corrected position.

Kevin Davis (KD): I really enjoy the design as well as the aggressive thread pitch and ease of insertion.

Q. What other hammertoe implants have you used in the past and how does this differ?

A. MB: Like most foot surgeons, I have tried a vast array of hammertoe implants and forms of fixation. My practice has transitioned from Smart Toe™ implants, to PLLA pins, to K-wires, to headless compression screws and back again. The DynaNite PIP implant is different because (1) it provides the ability to use an "all-inside" technique and not violate the DIP joint; (2) you get reproducible correction with quick and easy implantation due to the cannulated design; and (3) the small size of the implant in the proximal phalanx leaves the surgeon enough usable bone for a plantar plate repair or a flexor tendon transfer.

KD: I’ve used pretty much every implant on the market, including the Phalinx™, Smart Toe, Arrow-Lok™, and ToeTac™, as well as conventional K-wires.

Q. Some surgeons don’t like any type of hammertoe implant because of removal concerns. How would you remove the DynaNite implant if the patient needed a revision?

A. MB: The design places the prongs in the proximal phalanx so they are directed toward the PIP joint and would be easily accessible in the event of a nonunion. Also, the flexibility of the Nitinol construct would necessitate very little bone resection in the event of a malunion. Once the prongs were made visible, they could be compressed with a hemostat and the removal of the proximal portion of the implant could be performed. This would allow for the distal portion to be unscrewed in a retrograde fashion. Worst case scenario, a small dorsal cortical window could be made above the proximal portion of the implant and the prongs removed, allowing once again for the removal of the distal portion with minimal bone loss.

KD: This, in my experience, is a rare occurrence. I propose two different methods: K-wire insertion into the proximal phalanx, on both the medial and lateral aspects, until they abut the prongs, and depress them into the shaft of the implant so that the proximal portion of the implant can be removed. One would then simply turn the threaded portion counterclockwise to remove it from the middle phalanx. In the case that fusion has occurred one could consider a "key hole" osteotomy just proximal to the prongs. One could grasp the implant and turn counterclockwise.

*Smart Toe and ToeTac are trademarks of Stryker. Phalinx is a trademark of Wright Medical. Arrow-Lok is a trademark of Arrowhead Medical Technologies.
Q. What is your postoperative protocol when using the DynaNite PIP implant? Have you noticed any improved patient satisfaction rates since starting to use this implant?

A. MB: Most of my postoperative protocol is based on limitations by adjunctive procedures. In the circumstance of an isolated PIP joint arthrodesis, I would allow my patients to bear weight immediately in a postoperative shoe or boot, followed by return to normal shoes in 3 to 4 weeks as dictated by edema. Because of the gap recovery and memory effect of the Nitinol present, I feel more comfortable with the patient using a propulsive gait in normal shoes earlier in the recovery period than I would with a truly rigid construct.

KD: Heel weightbearing in an OrthoWedge™ shoe to tolerance for 4 weeks. The K-wire, if used, is removed at week 4 and then the patient is allowed to bear weight in a flat-soled postoperative shoe for 2 to 4 weeks with transition into conventional shoes at that time. Patients are extremely satisfied with the results thus far.

Q. How does the fixation of this implant compare to others you have tried?

A. MB: I feel like the fixation is very stable and engages both bones very well. The distal threaded portion prevents pull-out failure and rotation of the poor middle phalanx component. Since the proximal prongs incorporate the forgiveness and memory of Nitinol, I am not concerned about cortical fracture in the proximal phalanx or loss of fixation due to thin cortical walls in the proximal phalanx.

KD: The implant has an aggressive thread pattern with excellent bite. The press fit portion of the proximal part of the implant complements the threads on the distal portion in providing stability with some degree of compression. The cannulated nature allows one to pin the MTP as well.

*OrthoWedge is a trademark of Darco International.

Reference
1. Arthrex, Inc. Data on file (APT-03930). Naples, FL;
Q. Can you describe your technique and any tips/pearls you have found since starting to use the DynaNite PIP implant?

A. MB: Preoperatively, my patients and I discuss expectations and the options of the straight and plantar-flexed implants. This generally guides my choice of implant used on each patient. My technique generally follows the technique guide.

I typically use a dorsal midline incision, but have also used transverse and semi-elliptical approaches with no difficulty. After dissection down to the articulation of the PIP joint, the designated straight or plantar-flexed implant will be presented on the Mayo stand.

I make the appropriate cuts with a small oscillating saw and check visually and radiographically that the opposing bony ends line up well with one another.

I then place a 1.1 mm K-wire into the proximal phalanx and drill to the laser line using a 3.0 mm drill. The 1.1 mm K-wire is then removed and placed through the base of the middle phalanx, and directed out the distal tip of the toe.

I then advance a 2.5 mm drill bit in the middle phalanx to the predetermined laser line. The K-wire is then retrograded out of the toe until only the distal tip of the wire can be visualized at the PIP joint.

I place the implant on the inserter and screw the threaded portion of the implant into the middle phalanx over the guidewire until flush with the bone, with the prongs directed medially and laterally. This can easily be visualized radiographically, but appropriate position can also be determined by the beveled portion of the inserter being directed superiorly. I try to handle the proximal prongs very little. I am careful not to bend or damage them with a hemostat. I plantar flex the toe and place the pronged portion of the implant into the predrilled proximal phalanx and manually compress. I’ve found this to be fairly simple compared to other implants because of the shorter size of the proximal portion of the implant.

To ensure maximal compression I place the included cannulated tamp over the distally exposed wire, holding it firmly against the distal tuft of the toe, and use a small mallet to compress the toe at the arthrodesis site.

Finally, I advance the K-wire through the proximal portion of the implant to fully engage the prongs into the cortical walls of the proximal phalanx. The surgeon may then remove the K-wire or advance the wire proximally to stabilize the MTP joint.

KD: I resect the cartilage of the PIP joint in the usual fashion. I retrograde the K-wire out of the distal aspect of the toe after placing it in the middle phalanx, taking care to leave it flush with the middle phalangeal base. Next, I tap the proximal and middle phalanges and then I insert the threaded distal portion into the middle phalanx, realign the digit, and press-fit the proximal phalangeal component. I then advance the K-wire across the fusion site, through the implant to engage the prongs, spreading them outward into the phalangeal bone. I will continue advancing the K-wire across the MTP, if desired.

The only tip that I have is that I would highly recommend tapping the proximal phalanx, which is an optional step, to help facilitate implant placement.

Q. Any other comments or suggestions you would have for other surgeons who are considering starting to use this implant?

A. MB: After making your bone resections, check your alignment visually and fluoroscopically. If your resected ends are not well aligned, feather the joint with the oscillating saw until adequate apposition is achieved. After this, implantation of the implant is very simple, reproducible, and straightforward. Also, if the K-wire bends at any point prior to advancing to engage the prongs at the completion of the procedure, remove the proximal prongs of the implant, and then remove the K-wire and replace it with a new wire. This will ensure optimal engagement into the cortical walls of the proximal phalanx and allow for maximal torsional stability and compression. Also, as previously mentioned, handle the proximal prongs sparingly to assure optimal medial and lateral engagement in the proximal phalanx.

KD: Give it a try. I think that you will be highly satisfied with your outcomes, as well as with your patients.
Q. Considering the negative connotations with early-generation minimally invasive surgery, what motivated you to begin implementing MIS into your practice?

A. I first became interested in MIS surgery when I noticed my bunionectomies either had suboptimal correction, problems with the incision (ie, incision too large or dehiscence), or recurrence. MIS techniques have provided the best of both worlds: less trauma with smaller incisions leading to faster post-op recovery. Current day concepts are similar to early-generation MIS; however, the execution is greatly improved with better instrumentation. The Arthrex MIS power unit performs at low speed and high torque, allowing it to both cut through bone and simultaneously protect the soft-tissue structures. On top of that, the Arthrex Compression FT screws provide optimal cannulated compression screw fixation.

Q. Since the inception of third-generation MIS, many new techniques have been described: bunion corrections, medializing calcaneal osteotomies, cheilectomies, and more. Which techniques would you recommend a new surgeon adopt initially?

A. I would recommend that new MIS surgeons implement the techniques and procedures that the surgeon is comfortable performing in an open setting. MIS techniques require a mental 3-D orientation, aided with intra-op fluoroscopy, and therefore understanding the procedure with an open technique is vital. Generally speaking, I find that the calcaneal osteotomies are the most forgiving.

Q. There has been quite a lot of positive clinical data recently in support of MIS compared to open techniques. In your hands, how would you compare your MIS outcomes to your open outcomes?

A. My MIS outcomes have far surpassed my expectations to the point that MIS techniques are my first-line option for many procedures. Far superior fixation with the Compression FT screws in combination with minimal incisions have led to improved surgical outcomes and further minimized postoperative complications such as infection and dehiscence.

Reference
Q. On top of MIS bunion procedures, you have had a lot of experience with both MIS bunionette with fixation and MIS hammertoes with fixation. For surgeons looking to adopt these techniques, what tips and tricks can you offer that you might have learned along the way?

A. In my opinion, positioning is paramount. Positioning not only the patient, but yourself as the surgeon, C-arm, pedal for the MIS burr, and even the back table. I compare the OR to an orchestra. The surgeon, as the conductor, should dictate not only the next step but also position everything to optimize surgical results. For instance, as a right-handed surgeon, I have the mini C-arm enter from the patient’s right side for every MIS bunion so that my right hand is near the medial aspect of the bunion and I am able to see the foot. For right foot surgery, I am standing at the foot of the OR bed facing the patient and for left foot surgery I am standing to the patient’s left side facing down towards the feet.

Q. If you had to choose your favorite MIS procedure or case to date, what would it be and why?

A. My favorite MIS procedure is hallux valgus repair for several reasons:
1. This is the most common procedure I perform and therefore has the greatest impact.
2. Arthrex’s MIS bunion technique uses a transverse osteotomy, which allows for aggressive transverse plane correction.
3. The technique also allows for simple coronal plane correction by being able to rotate the sesamoids underneath the metatarsal head, minimizing the chance for recurrence.
4. The minimal incision is a game changer.
5. Patients love it! They love showing off their tiny incisions to their friends and family, especially if they themselves have had bunion surgery with the traditional incision.
Q. How have you evolved from screws to staples?
A. I was classically trained with solid core screws for a majority of my reconstructive/trauma cases. As I have progressed in my practice I have found FT cannulated screws superior with regards to precision and compression. The anatomy of the foot is complex and does not always allow for screw placement. I have always been intrigued by staples due to the ease but never was convinced about the compression. When Arthrex developed the DynaNite staple, I was intrigued with the continuous compression that Nitinol provided. With hardware irritation always a concern, I liked that it was the lowest profile staple on the market. I first used the staple with second and third metatarsal cuneiform joint fusions. What struck me immediately was the ease of use and the amount of compression.

Q. Where do you see the use of the DynaNite staple?
A. Metatarsal-cuneiform joint fusion was perfect as the contour of the joints was not ideal for screw fixation; a staple would bridge the joint and allow for equal compression. I have expanded the use of the staple to Akin osteotomies, lapidus, talonavicular fusions, naviculo-cuneiform fusions, and calcaneocuboid fusions. The one disadvantage in using the original DynaNite staple was the size of the bridge. With the amount of motion through the hindfoot, there was the need for a larger staple.

Q. What have been the advantages of the DynaNite SuperMX staple?
A. The SuperMX staple retains the simplicity of the original DynaNite instrumentation with a larger bridge measuring 4.5 mm. This larger bridge provides for greater rotational stability and has 50% more compression.1 Although you have a larger bridge, it is still extremely low profile, and does not cause any hardware irritation. These two advantages make the SuperMX staple the mainstay of my hindfoot fusions (calcaneocuboid joint fusions, talonavicular fusions, and navicular cuneiform joint fusions). I have increased confidence that I am providing the most rigidity and compression to my osteotomies/fusions.

Q. Do you feel the DynaNite SuperMX staple will help you treat your patients better?
A. As surgeons, we are always looking for instrumentation that is going to provide better results. The SuperMX staple has transformed my practice for several different reasons. The first and most important is compression. The compression afforded by the DynaNite SuperMX staple has been shown to be superior to other staples. With the addition of a wider bridge there is also more strength and rotational stability. Second, with the simplicity of the instrumentation; you can precisely place the staple in the exact location that is biomechanically advantageous. Lastly, the simplicity of staple insertion allows the surgeon to spend less time placing fixation. This has decreased my operative time by more then 20% for hindfoot fusions. I can honestly say that the SuperMX staple is allowing me to treat my patients better and in a safer manner.

Reference
Q. What technical pearls can you offer with your experience using the DynaNite SuperMX staple?

A. There are several key points when using the SuperMX staple. The surgeon must be aware of the various fixation options available. I will place my guide pins and then use intraoperative fluoroscopy to ensure that I have spanned my osteotomy/arthritis site with a large enough bridge. If the staple needs to be removed, the instrumentation that I have found that works the best is the freer. I will place the freer under the bridge and create a space between the bridge and the bone. Once there is enough space between the bone and the staple, I can place the inserter underneath the staple and engage the arms to allow the staple to be removed.

Q. Would the postoperative protocol change with this stronger construct?

A. With the DynaNite SuperMX staple I have changed my postoperative protocol. I am now weightbearing my hindfoot fusions at 4 weeks instead of 8 weeks. With my calcaneocuboid joint fusions, I use two SuperMX staples and I am confident that there will be no motion. If I have controlled weightbearing with solid fixation, I feel my patients can start walking and rehabbing sooner.
Case 1 – Navicular Cuneiform Fusion

This 44-year-old active male patient with collapse of the medial column and progressive pain and deformity had exhausted conservative measures. Due to the patient’s age and activity level it was decided that stabilizing the medial column with a navicular cuneiform fusion with calcaneal osteotomy would allow the patient to continue his active lifestyle without eliminating hindfoot motion.

An osteotomy fixated with multiple FT screws was performed. FDL transfer was performed using a 4.75 mm SwiveLock® anchor with a blind tunnel technique. After preparing the navicular cuneiform, a SuperMX staple was placed medially for compression of the plantar/medial aspect of the joint; excellent compression was achieved immediately. A second point of fixation was achieved with a 4.0 Compression FT screw. A second dorsal incision was used to prepare the middle cuneiform-navicular joint and a DynaNite staple allowed for immediate compression with stability. The use of the DynaNite staple allowed for a powerful construct with reduced operative time.

Case 2 – Triple Arthrodesis

This 59-year-old man had suffered a stroke 10 years prior. His foot has progressively become nonbraceable and he was no longer able to ambulate. By the time the patient presented, he had a severe cavovarus deformity. Triple arthrodesis was performed. Two SuperMX staples allowed for stable fixation of the calcaneocuboid joint. Fixation of the calcaneocuboid joint has always been difficult with a single screw, and plate fixation never offered adequate compression. The SuperMX staple allowed for excellent compression and rotational stability. The talonavicular and subtalar joint were fixated with the combination of staple and screw fixation. Lastly, a Tension-Slide Technique was performed with the posterior tibial tendon being transferred to the lateral aspect of the foot.
Q. Can you explain how your practice has changed since InternalBrace ligament augmentation technology?

A. The InternalBrace ligament augmentation has completely revolutionized my practice. Historically when performing the standard Broström procedure, my patients were splinted for up to 3 weeks post-op. With the InternalBrace ligament augmentation, my patients are weightbearing as tolerated almost immediately. This has led to accelerated rehabilitation, greater range-of-motion, quicker return to work/activity, and better outcomes overall. I could not imagine my practice without InternalBrace ligament augmentation.

Q. What has been the biggest difference you have seen in your InternalBrace ligament augmentation patients versus the non-InternalBrace ligament augmentation patients you have treated in the past?

A. The biggest difference I’ve seen in the patients I’ve treated with InternalBrace ligament augmentation has to be their improved ankle stability, throughout their entire postoperative course. I’m significantly more confident in my repairs, and I worry less with their aggressive postoperative protocol. The InternalBrace ligament augmentation has given me complete peace of mind with each patient I treat for lateral ankle instability.

Q. How has the InternalBrace system 2.0 supported your practice and your operative time?

A. The InternalBrace ligament augmentation system 2.0 has enabled me to elevate my practice to a whole new level! Before being introduced to the new system, I was working on minimizing my incision with a percutaneous approach. Naturally, I struggled in the beginning with this approach because of the first-generation instrument limitations. The innovation with the InternalBrace ligament augmentation 2.0 has accelerated my operative time substantially. Surgical times have decreased on average from 45 minutes to about 15 to 20 minutes. I could not be happier with the speed and efficiency at which we are progressing.

For surgeons doing this technique with a standard open incision, the anatomic 7 mm talus offset guide will allow them to have a reproducible guide to support their anchor placement in the talus. It is a really great feature that you can drill, tap, and implant through the guide.

Reference

New Product Highlight
InternalBrace Ligament Augmentation System 2.0
Drill, Tap, and Implant Through the NEW Talus Offset Guide
- Surgical versatility - increased size and material options
- Radiopaque marker and laser-line window - determine SwiveLock® implant location
- Percutaneous/minimally invasive - cannulated drills/taps with ability to implant SwiveLock anchor through the guide
- Biologically advantageous - collagen-coated FiberTape® suture and JumpStart® antimicrobial dressing
Q. What are some additional features of the InternalBrace 2.0 system that surgeons may find beneficial?

A. The cannulated instrumentation in the InternalBrace ligament augmentation system 2.0 is a primary game changer. The cannulation factor alone expedites the procedure substantially. The multiple size options is a great offering as well. Although I still typically choose the 4.75 mm/3.5 mm BioComposite option, I see the value in the 3.5 mm/3.5 mm PEEK for use in patients with smaller anatomy.

Q. What have been the results of your InternalBrace ligament augmentations in your practice and your patients?

A. It is worth noting that the patients are more receptive to the InternalBrace ligament augmentation with the percutaneous approach. They see and understand the inherent value in the InternalBrace ligament augmentation "seatbelt." Whether I am treating an athlete that needs to get back on the field, or a construction worker that needs to get back on the job, they share similar goals. Even now after doing hundreds of lateral ankle stabilizations with InternalBrace ligament augmentation, every single one is special to me. This has become the gold standard of treatment in my practice, and I am excited to continue to see my patients benefit from it.

Q. Any other areas when you are applying InternalBrace technology?

A. As of late, I have been using the Lisfranc InternalBrace ligament augmentation for every ligamentous Lisfranc injury that I treat. Formerly, I used the Mini TightRope® fixation system and had good results. However, our intent as surgeons should be to graduate from good to great. The fact that I can achieve a more stable, knotless construct, with the presence of no button on the medial cuneiform, elevates the procedure from good to great. Other useful InternalBrace augmentation applications include deltoid ligament InternalBrace augmentation, superior peroneal retinaculum InternalBrace augmentation, and AITFL InternalBrace augmentation. I can’t help but subscribe to these other useful solutions. They make equally as much sense as the lateral ankle InternalBrace ligament augmentation.
What's in My Bag?
FDL and FHL Tension-Slide Technique

Q. With your experience and success with tenodesis screw fixation, what compelled you to consider the Tension-Slide Technique for tendon transfers?

A. What peaked my interest was the fact that this concept is the gold standard for distal biceps repair and the fact that we are able to achieve excellent strength\(^1\) at the time of the tendon transfer both cortical fixation with the DX button and aperture fixation with the BioComposite tenodesis screw. In addition, this technique allows me to make a smaller incision, less tendon needs to be harvested, and it allows for independent tensioning with both cortical and interference screw fixation and as the biomechanical studies demonstrated, a stronger repair than an interference screw alone.\(^1\) The Tension-Slide Technique is fast, simple, and allows for excellent reproducible clinical outcomes.

Q. For which foot and ankle pathologies are you able to apply the Tension-Slide Technique?

A. We are able to use the Tension-Slide Technique for FHL, FDL, tibialis anterior, and posterior tibial tendon transfers.

Q. Do you feel the Tension-Slide Technique will help you treat your patients better?

A. We have performed biomechanical tests on both the FDL and FHL Tension-Slide Technique and the results have demonstrated a stronger load to failure with the addition of the DX button.\(^1\) This data is submitted currently to peer-reviewed journals and awaiting publication.\(^1\) These results help give me the confidence that our repair is solid from time zero and depending on associated procedures being done at the same time, may allow us to advance patients into physical therapy and activities quicker.

Reference

New Product Highlight
Tension-Slide Tenodesis

- Maximize tendon-to-bone contact with the Tension-Slide Technique
- Strong cortical button fixation with aperture BioComposite Tenodesis screw fixation\(^1\)
- Multiple options for broad range of pathologies (FHL, FDL, posterior tibialis tendon, anterior tibialis tendon)
- Low-profile fixation

Reference
Q. What technical pearls can you offer with your experience using the Tension-Slide Technique?

A. Incisions can be made smaller and less tendon needs to be harvested. When placing the 3.2 mm spade-tip guidewire, do it under fluoroscopy to make sure it is in the correct position. This is especially true with the FDL transfer as the navicular can be very narrow. I would also recommend reaming under fluoroscopy so you don’t penetrate the far cortex. Take your time both threading the Mini DX button and insert under fluoroscopy and watch the button flip on the cortex. Also, keep the inserter in while flipping the button to help facilitate correct placement on the cortex. Make sure to place a locking stitch in the transferred tendon before inserting the BioComposite tenodesis screw. This will help maintain the correct tension applied to the button and transfer.

Q. Would the postoperative protocol change with this tension-slide construct?

A. My postoperative protocol has changed with FHL, tibialis anterior, and posterior tendon transfers with the Tension-Slide Technique. Due to the excellent strength of the repair, I now keep my FHL transfers non-weightbearing for 2 weeks and then advance them into a walking boot with heel lifts. Physical therapy is generally started at 3 weeks postoperatively. Before this technique, I would keep all my FHL transfers non-weightbearing for 3 weeks, then 2 weeks in a walking cast, and transition to a boot and starting physical therapy at 5 weeks postoperatively. The same applies to tibialis anterior and posterior tendon transfers. Depending on what other procedures are done to augment my FDL transfers, the rate-limiting step is when I allow ambulation. My typical protocol for a joint-sparing flatfoot reconstruction is 3 weeks non-weightbearing, 2 weeks in a walking cast, and transition into a boot and begin physical therapy at 5 weeks postoperatively. If there are any hindfoot fusions at the same time as the FDL transfer, then we do not commence weightbearing for 4 to 6 weeks after surgery and then the same protocol applies.
What's in My Bag? 
*Achilles SpeedBridge™ Implant System* 

Luke D. Cicchinelli, DPM

Q. How has the SpeedBridge technique changed the way you treat insertional Achilles tendinopathy?

A. Very simply, the Achilles SpeedBridge technique affords one thing: peace of mind. When I first entered private practice in 1993 I never slept well the night before nor the next 2 months after cases of retrocalcaneal spurring and insertional calcific Achilles tendinopathy. The subset of patients that fails conservative care and requires this surgery are frequently not ideal candidates due to obesity and other medical comorbidities. I always fear the recovery period for the patients and the risk of wound complications on the posterior heel in this challenging patient base. When the SpeedBridge™ concept, implants, and instrumentation arrived on the scene, my trepidations with offering and performing this surgery and confidence in an uncomplicated recovery completely changed.

Q. How has the SpeedBridge technique changed your post-op protocol with your patients with this pathology?

A. As a foot and ankle surgeon, I fear the deep venous thrombosis and risk of pulmonary embolism with all my patients. This can be a devastating complication with little warning and few prodromal signs or symptoms. The use of the Achilles SpeedBridge repair allows me to avoid cast immobilization completely and place patients in a fracture walker boot and start early range of motion to get the calf muscle moving and keep the blood pumping. This changes everything for me and in fact this is a deeply personal issue as well, having recently lost a brother to pulmonary embolism that was completely unexpected and with no prior history. No one is immune to this risk. We simply have to get these patients moving as soon as possible and rehab as early as is prudent; the security of the repair via the SpeedBridge construct allows that.

Q. Can you explain your thought process for consideration of applying Achilles SpeedBridge repair to your insertional Achilles pathologies?

A. The thought process may be summarized as .... “Security of repair” allows “elimination of cast disease” allows “accelerated rehabilitation and reduction of postoperative risks” equals “peace of mind.”

Q. Can you describe the technique and the implants you use for Achilles SpeedBridge repair?

A. I favor a laterally based J-type incision to avoid the direct posterior skin incisions on the back of the heel and optimize the local blood supply to the area. I then will do a tendon-splitting incision or complete elevation of the Achilles tendon based on case-specific factors and then employ the traditional and well-described original technique of 4 SwiveLock® anchors and a crisscross repair to optimize contact pressure of the re-insertion zone of the Achilles to the back of the heel.
Q. How does this technique differ post-operatively and long-term from a single-anchor technique?
A. This differs from a single-anchor technique in that with a single anchor it is very difficult for me to feel comfortable in not placing the patient in a cast for at least 4 weeks and not worrying about the risk of an evulsion of the tendon. Long-term, I’ve found the SpeedBridge technique and the immediate use of a removable boot and earlier weightbearing avoids calf muscle atrophy and overall patient deconditioning and accelerates their rehab, and it return to work and activities.

Q. What does the science say about early weightbearing with the SpeedBridge technique?
A. The science clearly supports early weightbearing for Achilles tendon repairs in general, as controlled physiological stress is favorable to collagen organization and maturation. Specifically, regarding the SpeedBridge repair several years ago Rigby, Cottom, and Vora demonstrated excellent results with initiation of weightbearing at 10 days post-op. I personally teach and preach “fear the incision first” and routinely recommend 2 weeks of non-weightbearing to be 100% sure the incision has healed. Range of motion exercises may be allowed during this time period, albeit non-weightbearing in very compliant patients, as the strength of repair removes any real concerns of disruption of the tendon-bone interface.

Reference
Ankle Fusion Plating System Updates

- **Minimally Invasive Ankle Fusion Plate** – Mini-open approach for added stability to an arthroscopic tibiotalar fusion
- **Universal Short Talar Neck Plate** – Allows for robust fixation when patients have a short talar neck and talonavicular joint impingement is a concern
- **Anterolateral Ankle Fusion Plate** – Anatomically contoured with added points of fixation in the tibia for total ankle revisions or spanning large bone voids
- **Longer Lateral TT and TTC Plates** – Additional plate lengths added for difficult revisions
- **Updated Mini Joint Distractor** – Hands-free distraction for joint preparation and reduction for joint compression during plate or screw insertion
- **One Comprehensive System** – 7.0 mm Compression FT screws are now compatible with the Ankle Fusion Plating System

Case Review

Ankle arthrodesis is a salvage procedure indicated for properly selected patients with end-stage ankle arthrosis, chronic pain, gross instability, and/or acquired deformity. Following failure of conservative management, multiple surgical approaches have been described. These include ankle arthrodesis, including traditional open approaches and arthrotomy, limited incisional or “mini-open” approaches, and increasingly arthroscopic ankle arthrodesis. Primary surgical objectives include adequate preparation of the ankle joint, close approximation of the ankle joint surfaces, satisfactory functional “neutral” position of the ankle joint, and ensuring mechanical stability in “neutral” ankle joint alignment until an adequate fusion has matured and consolidated.

The Arthrex Ankle Fusion Plating System offers both cannulated screws and anatomic low-profile plate designs for traditional open or most recently added limited mini-open surgical approaches in one comprehensive system.

**Case 1** – “Standard” Ankle Arthrodesis via Screw Construct

Open, mini-open, or arthroscopic techniques may be employed per surgeon preference. Percutaneous application of crossing solid and/or cancellous screw fixation via standard guidewires is employed to ensure an adequate internal fixation construct and conforming apposition in neutral alignment.

**Figures 1 and 2.** Alignment of converging guidewires demonstrating posterior translation of the talus and screw trajectory

**Figure 3.** “Homerun” screw position posterior laterally to level of the talar body
Case 2 – Anterior Anatomic Plating Technique in Primary and Revision Ankle Arthrodesis
A standard anterior incision and anatomic dissection is created to safely expose the entire ankle joint. Distraction of the ankle joint may aid in visualization and joint preparation of the tibial and talar articular interfaces. Adequate debridement and preparation of the articular surfaces including the gutters is performed with a combination of hand and/or power instruments. Complete resection of anterior-based osteophytes and partial resection of the anterior distal tibia may be helpful to provide an adequate anterior plate interface. Satisfactory positioning of the talus within the ankle mortise in neutral sagittal and frontal plane alignment is established and confirmed. Provisional fixation is placed and alignment is confirmed.

Figures 4 and 5. Standard anatomic dissection for anterior exposure to ankle joint

Figure 6. Standard primary anterior anatomic plate ankle arthrodesis construct

Figures 7 and 8. Preoperative radiographs demonstrating ankle arthrodesis malunion (fixed equinus)

Figure 9. Intraoperative templated corrective “anterior fusion mass revisional osteotomy”

Case 3 – Lateral Anatomic Plating Technique (Acquired Cavovarus Deformity)
A standard lateral incision is planned and developed with resection and removal of the distal fibula. An ancillary small anterior medial based arthrotomy may be considered and helpful for adequate debridement and preparation of the articular surfaces. The lateral tibia and/or lateral talus may require contouring to improve bone-plate interface. Adjunctive anteromedially applied leg screw fixation is also considered, providing added mechanical support and close apposition to the intended fusion mass.

Figures 10, 11, and 12. Postoperative radiographs demonstrating plantigrade ankle arthrodesis after corrective realignment

Figures 13 and 14. Preoperative radiographs demonstrating a severe acquired cavovarus deformity

Figures 15 and 16. Postoperative AP ankle view demonstrating lateral anatomic fusion plate/adjunctive screw
Patient Selection
Almost every fibular fracture from simple to complex can be stabilized using an antegrade fibular nail.

My recommendation is to start with simple fractures, like uncomplicated Weber B fractures, and gain comfort with the nail making prior to moving to more complex comminuted/segmental injuries.

The greatest myth regarding the FibuLock nail is that the procedure is completely percutaneous. Greater than 90% of my fractures require at least partial exposure of the fracture to ensure appropriate length, rotation, and axial alignment.

Starting Point
As with any intramedullary device, the starting point and trajectory are critical. The most reproducible start point is just medial to the distal tip of the fibula on a mortise X-ray. The trajectory should follow the long axis of the fibular shaft.

My preference is to use a 2.5 mm drill bit instead of the cannulated guidewire. Wires may bend or continue down an errant hole despite attempts to redirect. A drill bit is stiffer, and may allow surgeons to more easily redirect their trajectory. The guidewire can then be exchanged after the drill bit is removed.

Nail Sizing
Ideally the fracture will be near the center of the nail. If the fracture is segmental or has proximal extension, the longer nail is recommended.

If the 3.2 mm proximal reamer passes without much cortical contact, the nail should be upsized.
Nail Insertion
During nail insertion the surgeon must be diligent in monitoring both the nail path as well as subtle changes in fracture alignment. Nail insertion produces an axial load on an oblique fracture, which can cause shortening/malrotation. The fracture will be easily visible beneath the targeting arm and should be evaluated throughout the stages of insertion. Two clamps can be used to reduce the possibility of malreduction.

Another potential cause of loss of reduction is over-countersinking the nail. As the nail is impacted beyond the distal canal, the larger portion of the nail enters this portion of the fibula prepared by the smaller reamer. This creates a “log-splitting” phenomenon that may change the surgeon’s original reduction. This pitfall is easily avoided by “over-reaming” the distal canal (6.2 mm drill) by 3 to 4 mm. If the nail is slightly countersunk, the larger portion of the nail is accommodated and no change in fracture alignment will occur.

Nail Depth
There are two intraoperative checks to ensure proper nail depth.

1. K-wire placed through the targeting arm to show the distal nail tip. The nail should not be left proud beneath the distal fibular cortex.

2. Relation of the syndesmotic holes to the physeal scar. The nail may need to be countersunk to allow both syndesmosis holes to be at the appropriate height for syndesmosis fixation, especially in injuries that have a highly unstable syndesmosis that may require two TiightRope® anchors to provide sufficient stability.

Prior to deploying the talons in the proximal nail, assess nail rotation by placing the cannula in the syndesmotic hole and evaluating the bimalleolar axis. The jig can easily be pinned to the tibia to maintain position. Placing a bump beneath the Achilles will prevent the OR table from internally rotating the nail.
New Product Highlight
DynaNite® PIP Hammertoe Implant

DynaNite PIP Hammertoe Implant

The PIP DynaNite hammertoe implant is the only threaded, cannulated Nitinol implant on the market. The implant barbs are extended by inserting a K-wire and cannulation allows for surgeons to cross the MTP joint with the K-wire if desired. Implants are offered in 12 mm, 14 mm, and 16 mm sizes (lengths and widths increase proportionally with straight and bent implants).

- The only threaded, cannulated Nitinol implant on the market
- The implant barbs are extended via insertion of a K-wire
- Cannulation allows for surgeons to cross the MTP joint with the K-wire if desired.
- Implants are offered in 12 mm, 14 mm, and 16 mm sizes
Newly Released DynaNite SuperMX staples

Arthrex is excited to announce the release of the DynaNite SuperMX continuous compression staples. Offering the same benefits of continuous compression as the DynaNite Nitinol staples, the SuperMX Nitinol staples can be inserted quickly with the easy-to-use, reloadable delivery device.

- Wider bridge (4.5 mm) provides better rotational stability in midfoot and hindfoot procedures.
- 50% more compression than the same size DynaNite staple
- DynaNite SuperMX staple is available in the following sizes:
  - 15 mm × 15 mm, 18 mm × 15 mm, 18 mm × 18 mm,
  - 20 mm × 15 mm, 20 mm × 20 mm, 25 mm × 20 mm

Reference

Compressive Force Comparison
SuperMX vs Titan vs Elite 20 × 20 implants

Talonavicular Arthrodesis
Lapidus Arthrodesis
Calcaneal Osteotomy
Calcaneal Cuboid Arthrodesis
TMT Arthrodesis
New Product Highlight
Mini Joint Distractor

The Mini Joint Distractor is a unique device that is adaptable for distraction and compression of osteotomies and fusion sites. It offers great flexibility for joint preparation, visualization, and intraoperative compression of the fracture or fusion site. This device gives the surgeon the option to use 1.6 mm or 2.4 mm guidewires or a stronger 3.0 mm traction screw.

- A new tightening mechanism ensures that the guide will not slide along the pins
- Can both compress and distract with the flip of a switch
- Holes for 1.6 mm, 2.4 mm, and 3.0 mm pins
- Distractor arms can rotate to allow the ideal angle and visualization during the procedure
- Can be easily broken down in three parts for cleaning
Navigate Tight Joint Spaces Like Never Before

**NanoScope™ Operative Arthroscopy System**

The smaller the joint space, the greater the advantages. The 2.2 mm NanoScope imaging system replaces the traditional rod lens arthroscope as the future of less invasive operative arthroscopy.

- **2.2 mm NanoScope Camera**
- **2.7 mm Diameter NanoCannula**
- **2 mm Diameter NanoBiter Punch**
- **Retractable NanoProbe**
- **Medical-Grade Camera Control Unit**

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