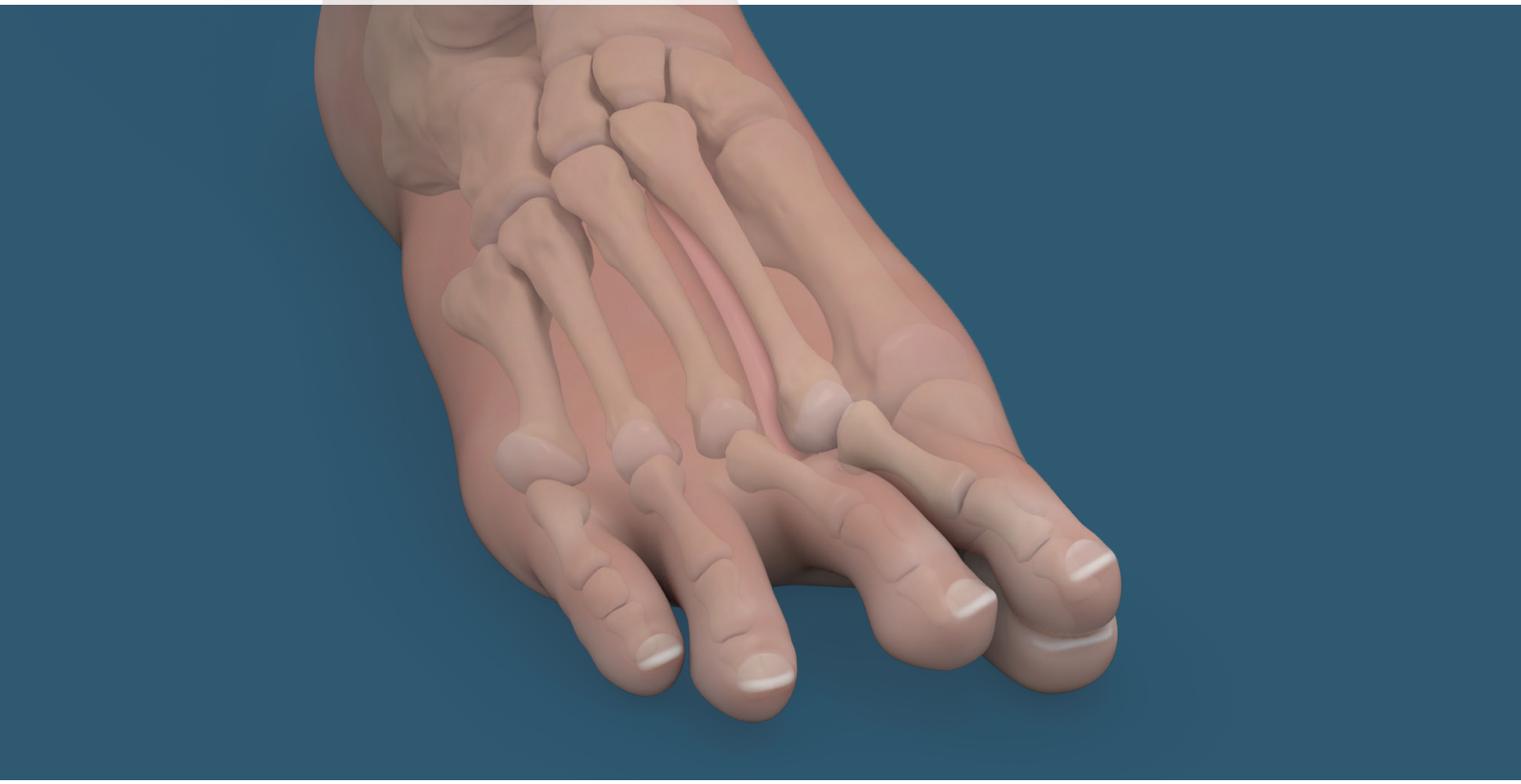
CPR™ Complete Plantar Plate Repair System

Surgical Technique



Arthrex®

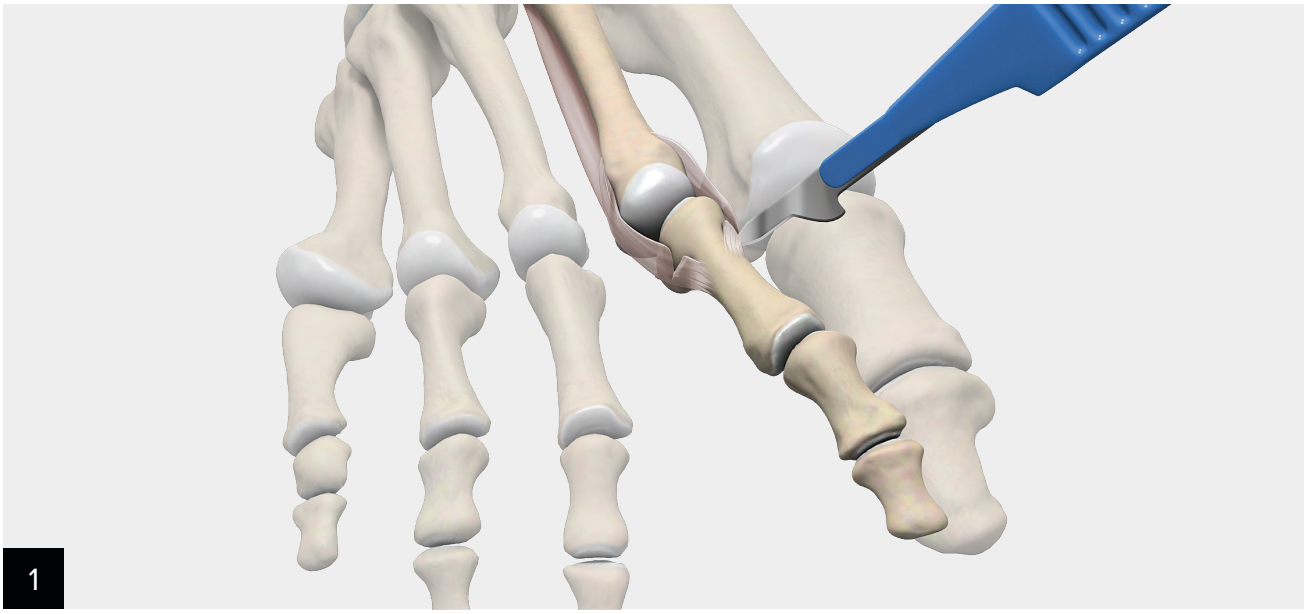
CPR™ Complete Plantar Plate Repair

Introduction

Arthrex is pleased to add the CPR Viper™ implant system to the CPR complete plantar plate repair system. Developed in conjunction with leading experts, this system solves one of the common difficulties encountered by foot and ankle surgeons, lesser MTP joint instability. The CPR Viper can be used with or without a metatarsal osteotomy.

The CPR plantar plate repair system was designed to help prevent floating toe, treat crossover toe, and repair an attenuated or torn plantar plate using a dorsal incision. Historically, techniques to treat a torn plantar plate have used a plantar approach, but many surgeons do not advocate this method because of the amount of dissection, complications with wound healing, and restrictions on postoperative ambulation.

The CPR implant system and instrument set is a comprehensive solution to treat plantar plate pathology. The Mini Scorpion™ DX, Micro SutureLasso™ and Viper™ suture passers provide state-of-the-art options for passing suture into the plantar plate, while the small joint distractor aids in visualization of the plantar plate. The surgical treatment we describe reconstructs the anatomic structures that lead to the instability of the lesser MTP joints. Plantar plate repair, lateral soft-tissue reefing, and metatarsal shortening can restore the normal alignment and function of the joint.

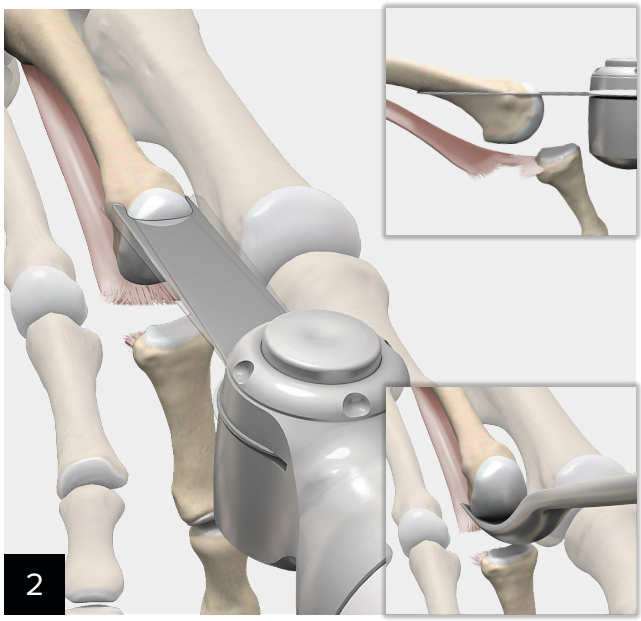


1

Incision/Dissection

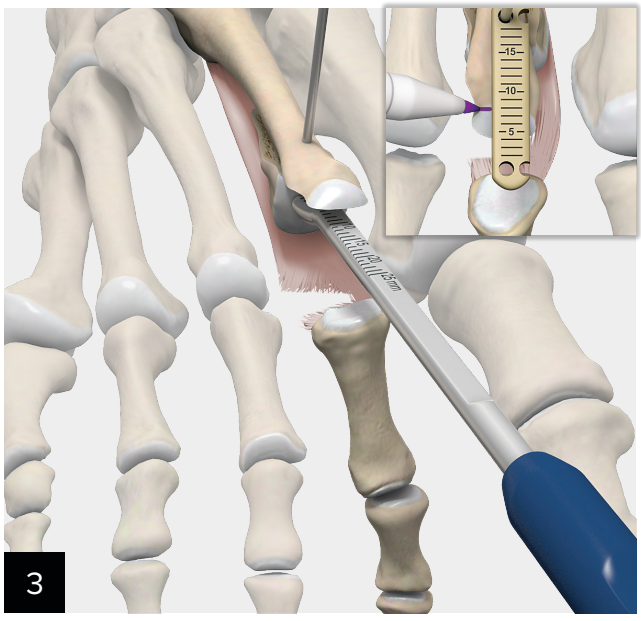
Place the patient in a supine position on the OR table. Center a dorsal longitudinal incision over the 2nd MTP joint and carry surgical dissection down to the extensor apparatus, where the extensor digitorum longus and brevis are split.

Place a self-retaining retractor deep between the extensor tendons to expose the MTP joint. The collateral ligaments are released from the base of the proximal phalanx, but the collateral ligament attachments on the metatarsal head are left intact.



Osteotomy

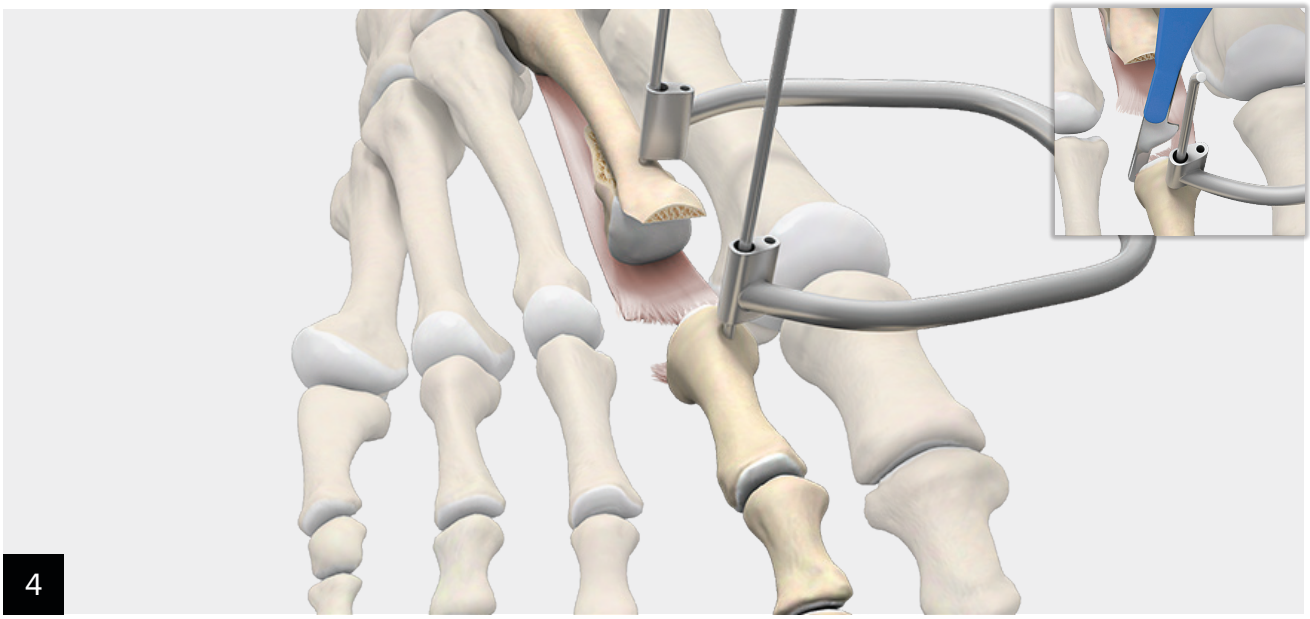
Use the McGlamry elevator to release the proximal portion of the plantar plate. This will aid in the necessary exposure and advancement of the plantar plate. Leave the accessory collateral ligaments intact on the medial and lateral side of the metatarsal head while releasing the proper collateral ligaments to aid in proper exposure of the plantar plate. The Weil osteotomy originates 1 mm to 2 mm below the dorsal aspect of the metatarsal articular surface. The angle of the osteotomy should be parallel to the weight-bearing surface of the foot. This angle is important to prevent plantar translation of the capital fragment as shortening is performed. If an osteotomy is not indicated, we recommend the CPR Viper suture passer for passing suture through the plantar plate.



Metatarsal Head Pusher

Once the osteotomy is complete, translate the capital fragment about 5 mm to 10 mm using the metatarsal head pusher. Temporarily fix the capital fragment in that shortened position with a vertical 0.062 in/1.6 mm K-wire. The K-wire should not penetrate the plantar surface of the capital fragment.

Optional: The metatarsal measuring device can be slid over the K-wire and marked to identify the length of the dorsal shelf. Based on this operative measurement, some of the dorsal shelf may be resected to further aid in visualization of the plantar plate.



4

Joint Distraction

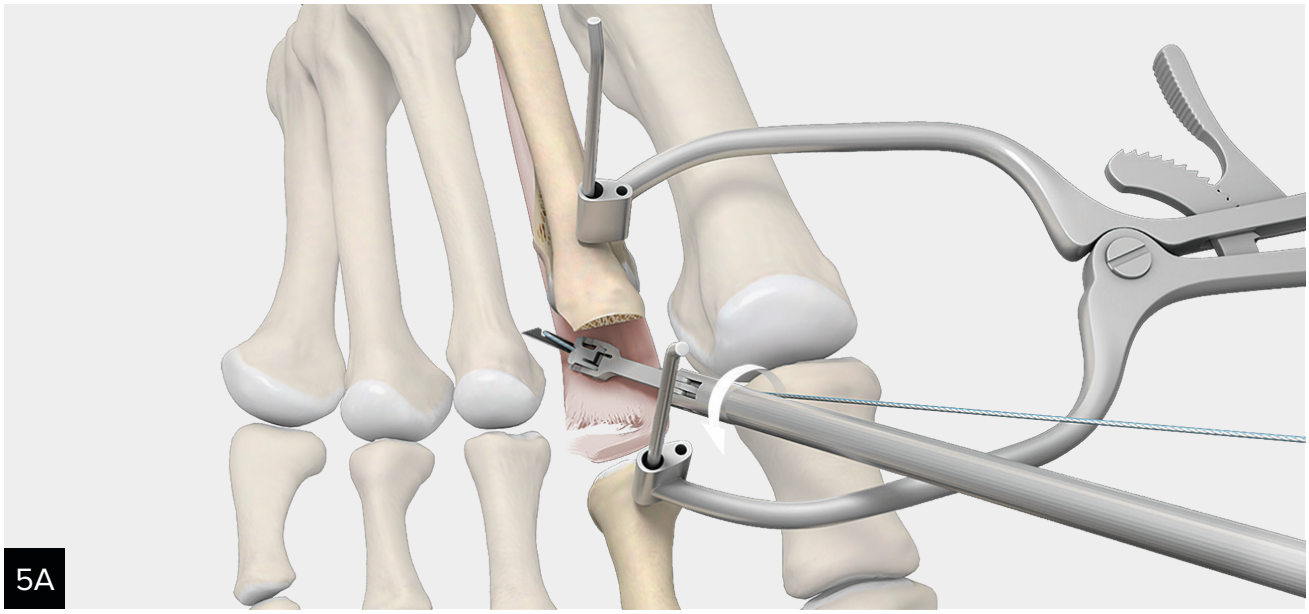
Use the small joint distractor to gain access to the plantar plate. Secure the device to the metatarsal component by using the initial 1.6 mm K-wire. Place another 1.6 mm K-wire from dorsal to plantar 5 mm distal to the base of the proximal phalanx to secure the second arm of the device. Once the distractor is placed, it can be opened to gain dorsal access to the MTP joint and the plantar plate can be clearly visualized.

Alternative Distraction

A right angle towel clamp placed along the sides of the proximal phalanx can be used to create manual distraction.

The most common tear patterns are partial and complete distal transverse tears at the distal insertion of the plantar plate. Make the partial tear a complete tear close to the insertion of the plantar plate to the proximal phalanx using a Beaver® 6400 Mini-Blade®*, being careful to avoid the flexor tendons. This reflects the plantar plate off the flexor tendon sheath and allows further mobilization of the plantar plate.

*Beaver and 6400 Mini-Blade are trademarks of BVI.



5A

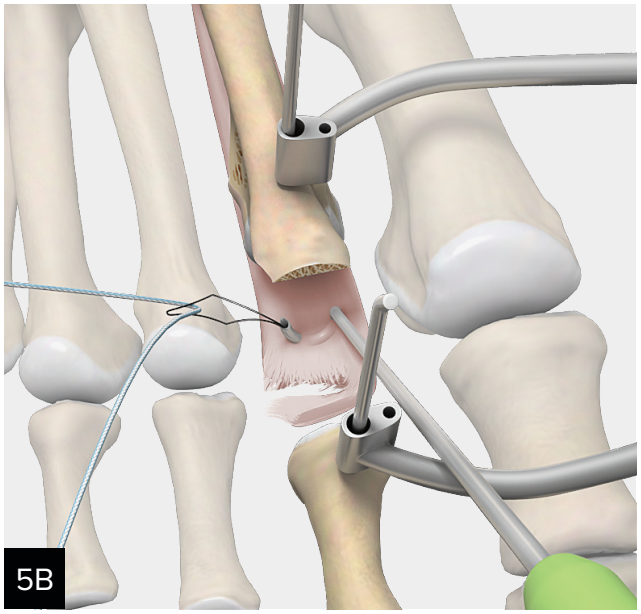
Pass Sutures

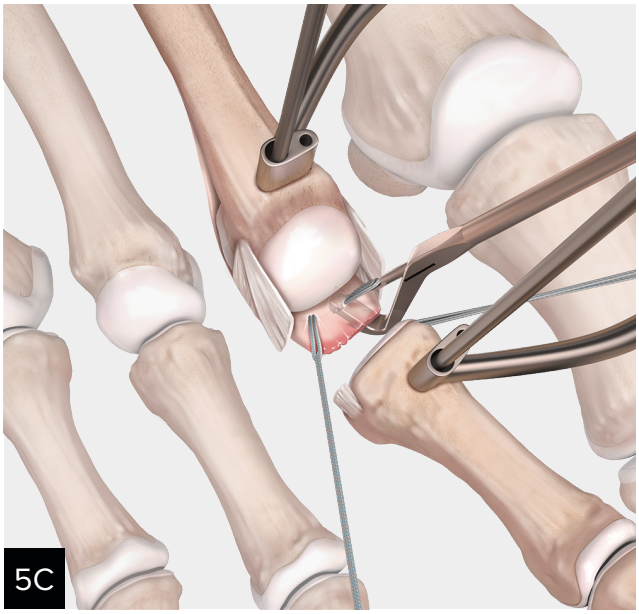
Mini Scorpion™ DX Suture Passer Technique

When the plantar plate has been completely mobilized, load the Mini Scorpion DX suture passer with 0 FiberWire® sutures. Use a pick-up to stabilize the plantar plate as the Mini Scorpion DX suture passer is inserted into the MTP joint and grasp the plantar plate medially or laterally by pulling the trigger with your fingers. With the Mini Scorpion DX suture passer in place, squeeze the instrument with the palm of your hand, advancing the needle and suture through the tissue. The needle will retract when the handle is released.

Surgical Pearl

When ready to engage the needle and pass the suture in the plantar plate, rotate your hand 30°-45° to prevent the needle from hitting the plantar surface of the metatarsal. When passed through the plantar plate, the suture locks into the “trap-door” feature of the Mini Scorpion DX suture passer, allowing for easy retrieval and “blind” shots. Retract the Mini Scorpion DX suture passer from the tissue and release the suture. The free end of the 0 FiberWire suture is reloaded into the Mini Scorpion DX suture passer and a second stitch is thrown into the plantar plate 3 mm to 5 mm medial or lateral to the initial stitch placement.

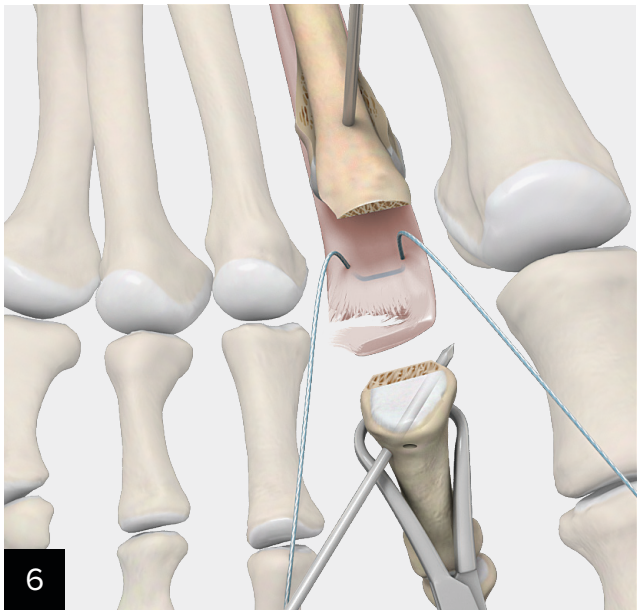




Pass Sutures (Cont'd)
Plantar Plate Pigtail Technique With Micro SutureLasso™ Suture Passer

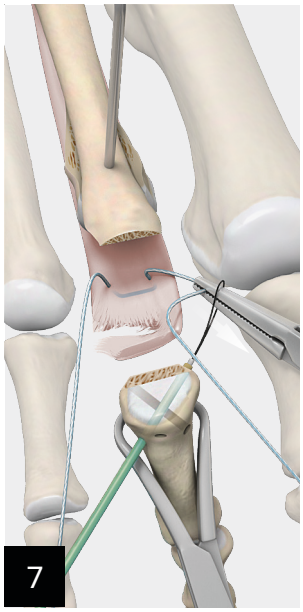
Once the plantar plate has been completely mobilized, place the right (red) or left (lime) Micro SutureLasso suture passer into the MTP joint. Use a pick-up to stabilize the plantar plate while applying the suture passer to puncture down and up in the plantar plate. Once inserted, push the black lasso forward and pass one of the 0 FiberWire® suture limbs through the loop. Pull the suture passer out, passing an inverted mattress with the suture.

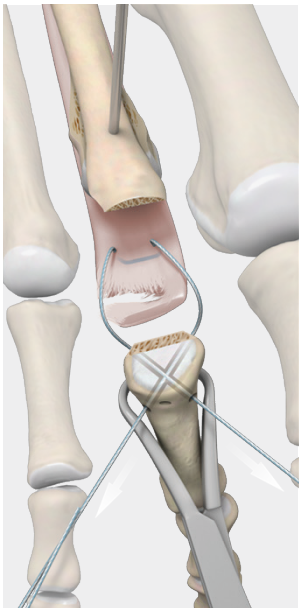
CPR™ Viper™ Implant System
When an osteotomy is not performed, use the preloaded CPR Viper suture passer to pass a cinch stitch in the lateral plantar plate. Reload the suture passer with 0 FiberWire suture and pass a second cinch stitch in the medial plantar plate.



Bone Tunnels

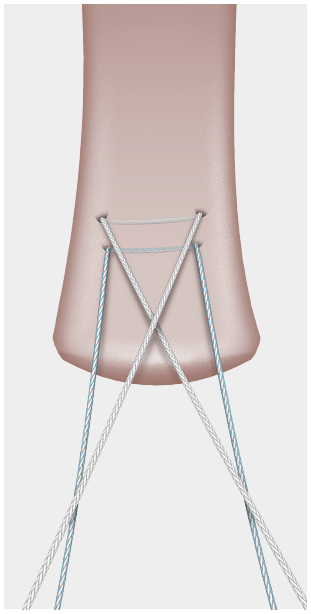
Remove the small joint distractor and the K-wire in the phalanx. Use a right-handed towel clamp to plantarflex the phalanx. Roughen the plantar edge of the proximal phalanx using a rongeur, curette, or rasp to prepare the surface for reattachment of the plantar plate. Based on surgeon preference, create two parallel or two crossing drill holes with a 1.6 mm K-wire. It is critical to see the K-wire exit the plantar phalanx just below the articular surface. This will allow for easier suture passing.

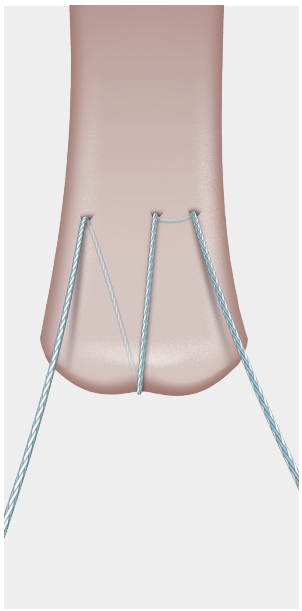




Pass Sutures Through the Phalanx

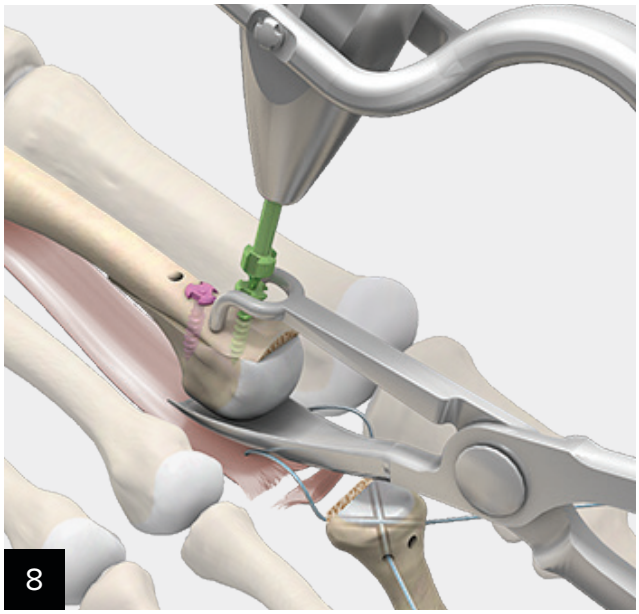
Place the suture retrieval funnel into one of the holes and then insert either the nitinol loop from the Pigtail Micro SutureLasso instrument or the stout nitinol suture passer with loop through the retrieval funnel.





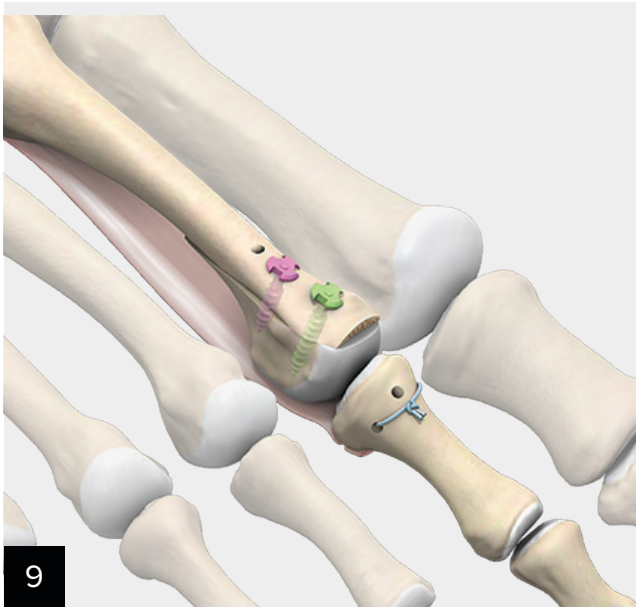
Pass a baby mosquito clamp through the nitinol loop and pass the FiberWire® suture through the bone tunnel. If two sutures are used, they should be color-coded (1 blue and 1 white).

Various suture patterns may be used depending on tears encountered. Additional sutures can be placed to add stability to the repair.



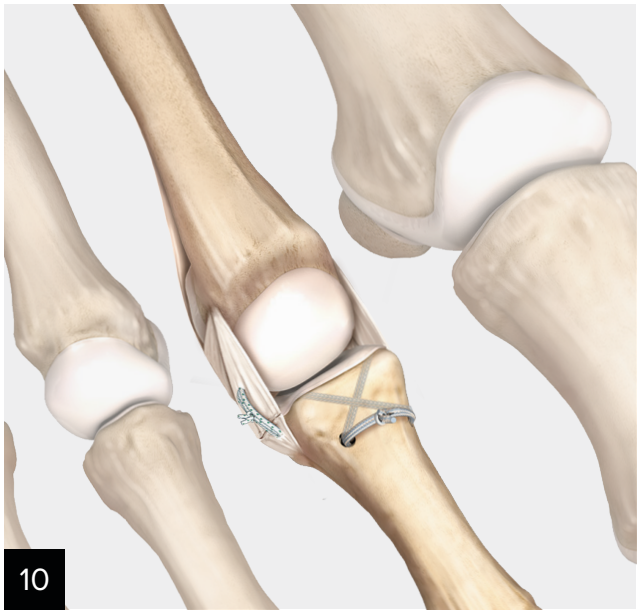
QuickFix™ Cannulated Screw System

Remove the K-wire from the metatarsal. Move the Weil osteotomy to the corrected position, holding it with the QuickFix clamp. Affix with one or two 2 mm x 11 mm and 2 mm x 13 mm snap-off QuickFix screws, typically with only 2 mm of shortening at the osteotomy site.
The clamp helps prevents rotation of the capital fragment and plantar gapping of the osteotomy.



Suture Tying

With the toe held reduced, plantarflex the toe 30° while making sure to pull out any slack in the suture before tying. Next, tie the sutures over the cortical bridge between the two drill holes, thereby advancing the plantar plate onto the proximal phalanx base.

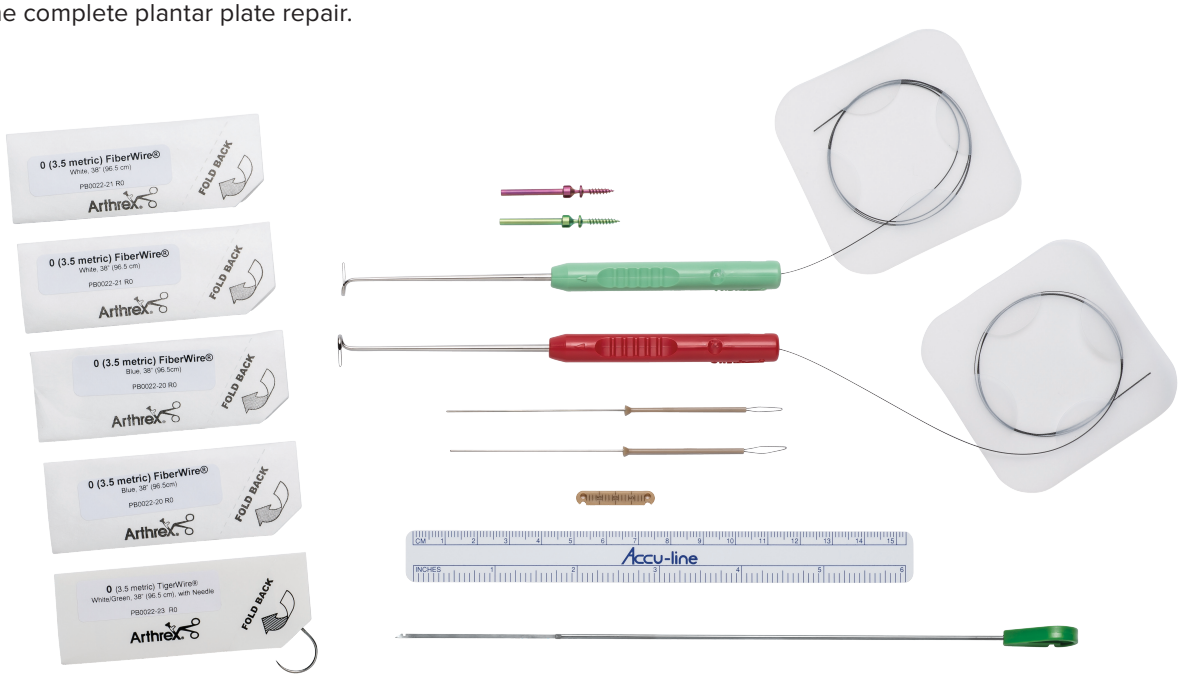


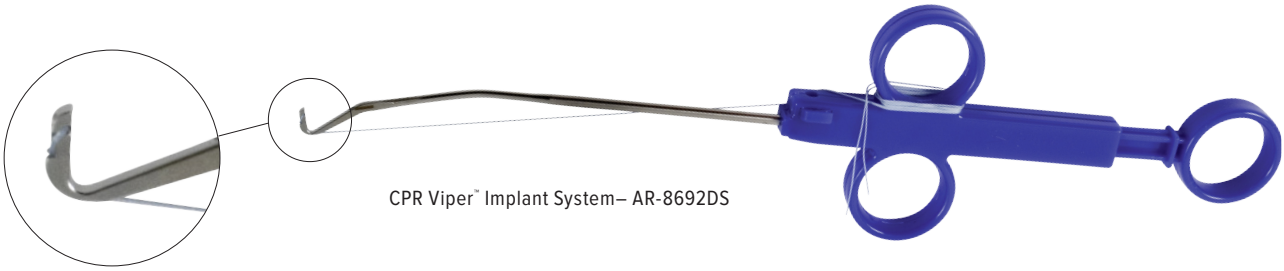
Post-op Protocol

Following surgery, a gauze and tape compression dressing is used to cover the forefoot. Ambulation is permitted in a postoperative shoe with full weightbearing on the heel for 6 weeks. Physical therapy is initiated at 7-10 days following surgery. At day 10 manual exercises commence (passive stretching and active exercises), with emphasis on increasing plantar flexion strength of the involved toe. Full forefoot weightbearing in an athletic shoe is allowed at 6 weeks after surgery, although if the osteotomy heals quickly, weightbearing may be allowed earlier. Activity may progress as tolerated, with aggressive walking at 8 weeks, and jogging or running allowed at 12 weeks.

CPR™ Mini Scorpion™ DX and Micro SutureLasso™ Implant System

The CPR Mini Scorpion DX and Micro SutureLasso implant system (AR-8690DS) includes the necessary materials for the complete plantar plate repair.





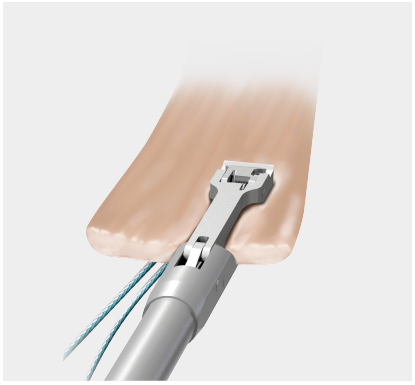
CPR Viper™ Implant System– AR-8692DS

Scientific Support

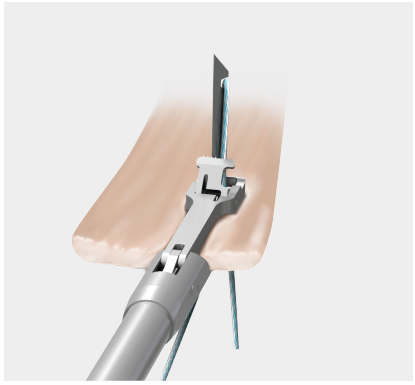
- Coughlin MJ, Schutt SA, Hirose CB, et al. Metatarsophalangeal joint pathology in crossover second toe deformity: a cadaveric study. *Foot Ankle Int.* 2012;33(2):133-140. doi: 10.3113/FAI.2012.0133
- Coughlin MJ, Baumfeld DS, Nery C. Second MTP joint instability: grading of the deformity and description of surgical repair of capsular insufficiency. *Phys Sports Med.* 2011;39(3):132-141. doi: 10.3810/psm.2011.09.1929
- Nery C, Coughlin MJ, Baumfeld D, Mann TS. Lesser metatarsophalangeal joint instability: prospective evaluation and repair of plantar plate and capsular insufficiency. *Foot Ankle Int.* 2012;33(4):301-311. doi: 10.3113/FAI.2012.0301
- Weil L Jr, Sung W, Weil LS Sr, Malinoski K. Anatomic plantar plate repair using the Weil metatarsal osteotomy approach. *Foot Ankle Spec.* 2011;4(3):145-150. doi: 10.1177/1938640010397342
- Coughlin MJ. Lesser toe deformities. In: Coughlin MJ, Mann CL, Saltzman CL. *Surgery of the Foot and Ankle*. 8th ed. Philadelphia, PA: Mosby Elsevier; 2007:363-464
- Cooper MT, Coughlin MJ. Sequential dissection for exposure of the second metatarsophalangeal joint. *Foot Ankle Int.* 2011;32(3):294-299. doi: 10.3113/FAI.2011.0294
- Nery C, Coughlin MJ, Baumfeld D, Mann TS, Yamada AF, Fernandes EA. MRI evaluation of the MTP plantar plates compared with arthroscopic findings: a prospective study. *Foot Ankle Int.* 2013;34(3):315-322. doi: 10.1177/1071100712470918
- Flint WW, Macias DM, Jastifer JR, et al. Plantar plate repair for lesser metatarsophalangeal joint instability. *Foot Ankle Int.* 2017;38(3):234-242. doi: 10.1177/1071100716679110

Loading of the Scorpion™ Suture Passer

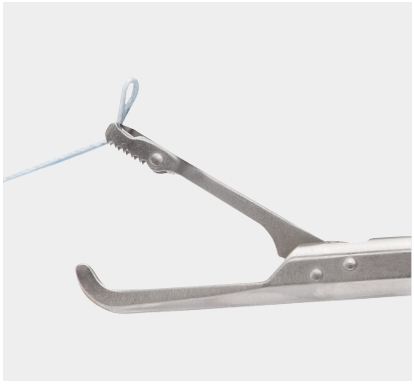
Once the Scorpion suture passer has been loaded, the next steps are to grasp, pass, and retrieve, as indicated in the adjacent illustrations. The Mini Scorpion™ DX suture passer has FastPass technology to automatically retrieve FiberWire® suture after passing through soft tissue. The instrument works well under direct visualization, as well as during “blind” passes through the plantar plate tissue, where access and visualization are often limited.



Grasp



Pass



Retrieve

Ordering Information

Mini Scorpion™ DX CPR Instrument Set (AR-8690S)

Product Description	Item Number
Instruments	
Mini Scorpion DX Suture Passer	AR-**8999**
Small Joint Distractor	AR-**8690SJD**
McGlamry Metatarsal Elevator, 11 mm	AR-**8930M**
QuickFix™ Clamp	AR-**8930MC**
Small Handle w/ AO Connection	AR-**2001AOT**
Driver Shaft for QuickFix Screw, 2 mm	AR-**8930D**
QuickFix Screw Cutter, 2 mm	AR-**8930R**
Metatarsal Head Pusher	AR-**8690P**
Mini Scorpion Instrument Case	AR-**8690C**
Accessories (must be ordered separately)	
Mini Scorpion DX	AR-**8999**
Mini Scorpion, curved	AR-**8999C**
Small Joint Distractor	AR-**8690SJD**
QuickFix Clamp	AR-**8930MC**
SutureLasso Pigtail Suture Passer, left, curved	AR-**8690SLL**
SutureLasso Pigtail Suture Passer, right, curved	AR-**8690SLR**
0 FiberWire Suture	AR-**7254**
Disposables	
Guidewire w/ Trocar Tip, 0.062 in (1.6 mm)	AR-**8941K**
Guidewire w/ Trocar Tip, threaded, 0.062 in (1.6 mm)	AR-**8941KT**
Guidewire w/ Trocar Tip, 0.078 in (2 mm)	AR-**8945K**
Guidewire w/ Trocar Tip, threaded, 0.078 in (2 mm)	AR-**8945KT**

CPR Mini Scorpion DX and Micro SutureLasso Suture Passers Implant System (AR-8690DS)

Product Description	Item Number
Mini Scorpion DX Needle	
SutureLasso Pigtail Suture Passer, right, curved	
SutureLasso Pigtail Suture Passer, left, curved	
QuickFix Screw, 2 mm × 11 mm	
QuickFix Screw, 2 mm × 13 mm	
Metatarsal Measuring Guide	
Suture Retriever, plantar plate, qty. 2	
Suture Retriever, 1.5 in funnel, qty. 2	
Ruler, 6 in	
SutureTape, white	
SutureTape, blue	
0 FiberWire® Suture, blue	
0 FiberWire Suture, white	
0 TigerWire® Suture w/ Needle, 38 in, white/green	

CPR Viper™ Implant System (AR-8692DS)

Product Description	Item Number
SutureTape, white	
Viper Suture Passer, w/ SutureTape, blue	
0 FiberWire® Suture, blue	
0 FiberWire Suture, white	
0 FiberWire Suture w/ Needle, 38 in, blue	
Suture Retriever, 1.5 in funnel, qty. 2	
Suture Retriever, plantar plate	
Ruler, 6 in	

Arthrex®