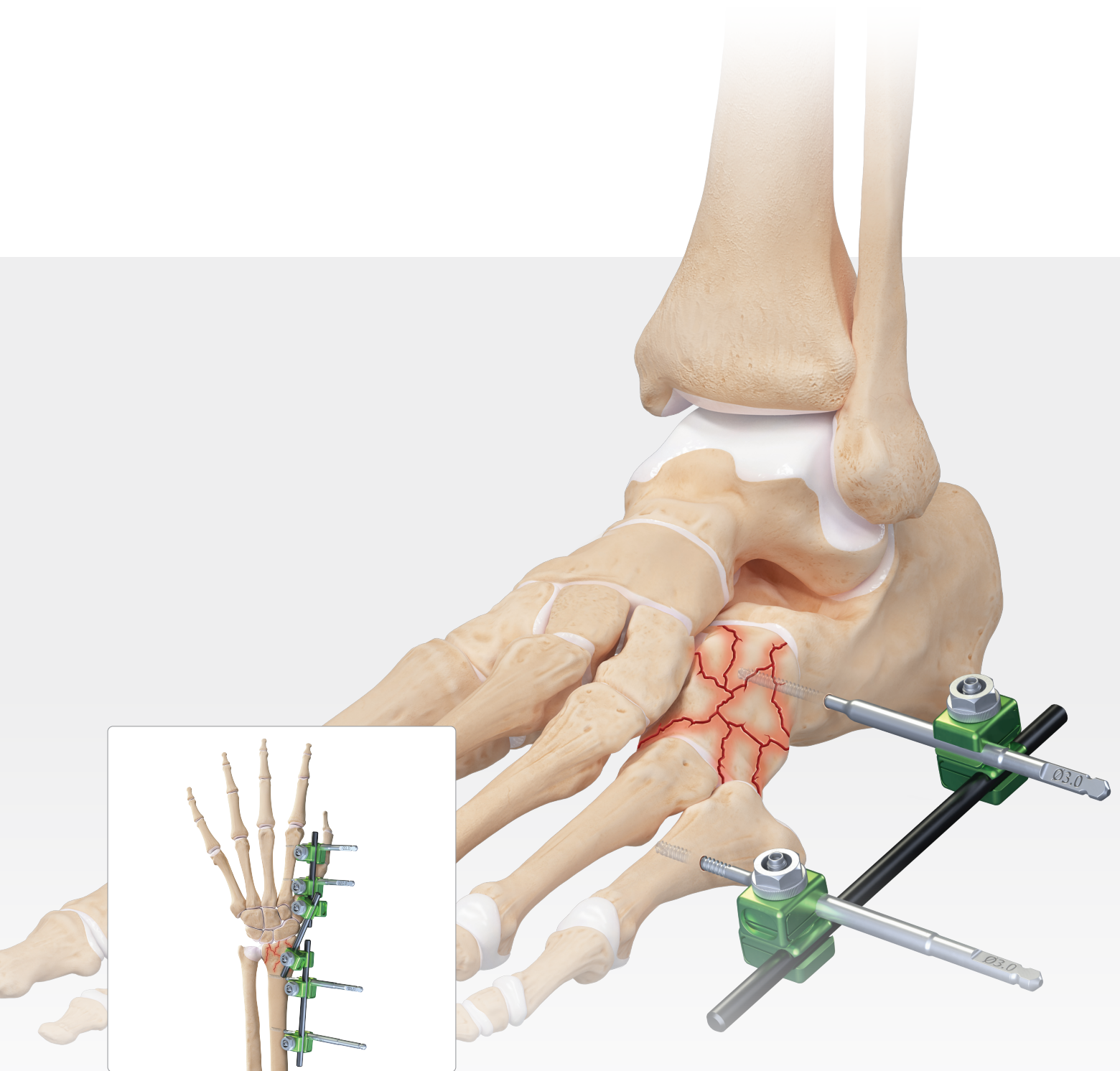


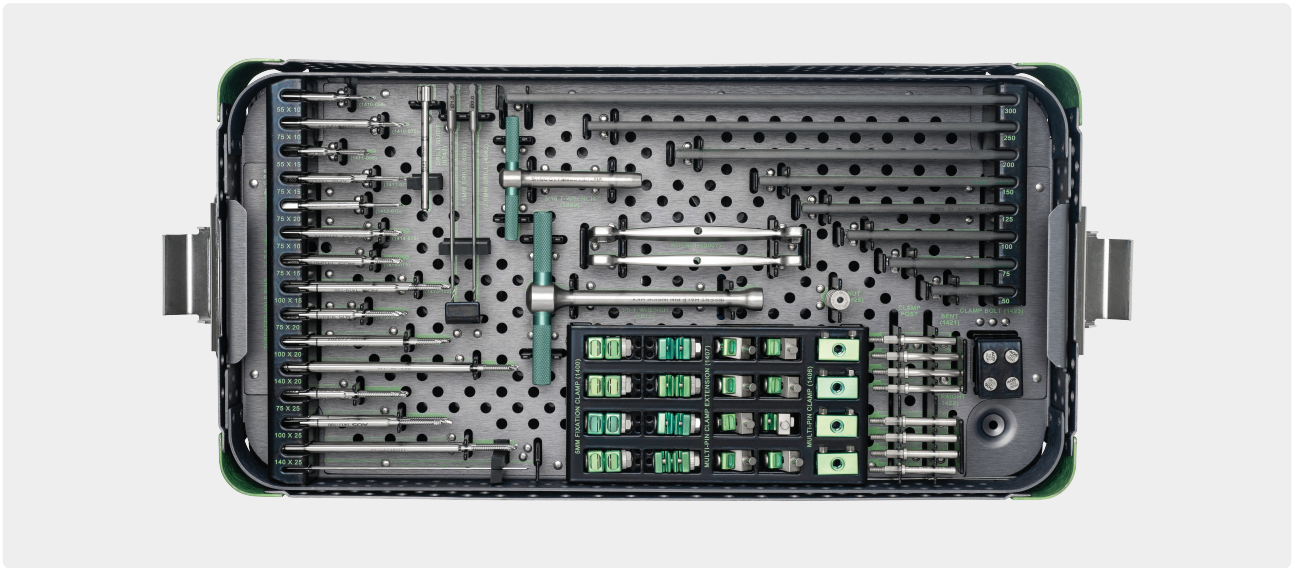
# Small External Fixation System

Surgical Technique



# Small External Fixation System

## Introduction



The Arthrex small external fixator (“small ex-fix”) system was designed to provide a solution for small-bone fixation. The system consists of 2.0 mm and 3.0 mm pins in a wide array of lengths, 5.0 mm carbon fiber rods, and multiple clamp options.

## Small Ex-Fix and ArthroFX® Systems Overview

	Small Ex-Fix	ArthroFX Large Ex-Fix
	<p>Not to scale</p> 	<p>Not to scale</p> 
<b>Carbon Fiber Rod Size</b>	5.0 mm	11 mm
<b>Pin Size</b>	2.0 mm and 3.0 mm	4.0 mm and 5.0 mm Schanz pins 6.0 mm transfixation pins
<b>Indications/Applications</b>	Hand, wrist, forearm, foot, ankle, and where soft tissue may preclude the use of other fracture treatments. Not intended for weightbearing.	Limb lengthening, osteotomies, arthrodesis, fracture fixation, and other bone conditions amenable to treatment with external fixation modality.
<b>MR Compatibility</b> 	Not evaluated for MR Compatibility. MR unsafe.	MR conditional

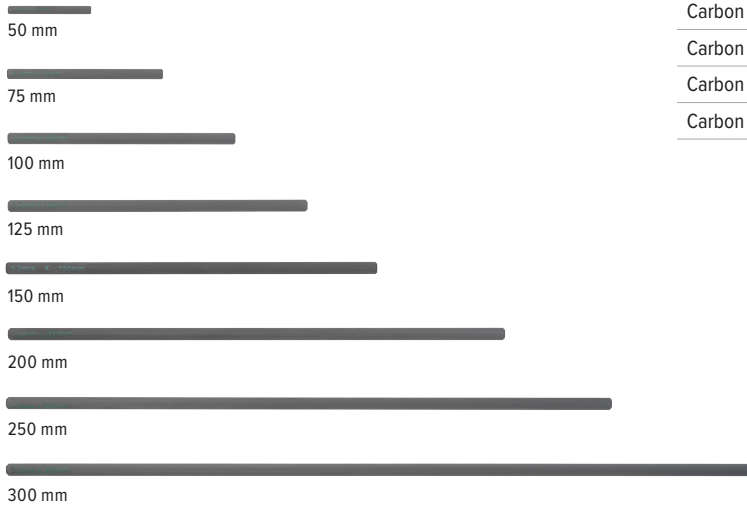
Chart is not meant to suggest interchangeable product use.

**Note:** For more information on the Small Ex-Fix, see surgical technique guide.

## System Components

### Carbon Fiber Rods

The 5.0 mm carbon fiber rods are available in a variety of lengths. Carbon fiber rods are radiolucent and lightweight for optimal patient comfort.



Carbon Fiber Rod, 5.0 mm × 50 mm	1181-050
Carbon Fiber Rod, 5.0 mm × 75 mm	1181-075
Carbon Fiber Rod, 5.0 mm × 100 mm	1181-100
Carbon Fiber Rod, 5.0 mm × 125 mm	1181-125
Carbon Fiber Rod, 5.0 mm × 150 mm	1181-150
Carbon Fiber Rod, 5.0 mm × 200 mm	1181-200
Carbon Fiber Rod, 5.0 mm × 250 mm	1181-250
Carbon Fiber Rod, 5.0 mm × 300 mm	1181-300

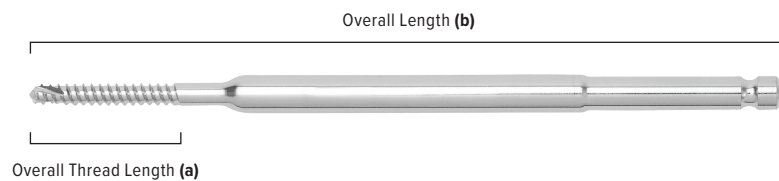
### Pins

The small external fixator comes with a comprehensive array of self-drilling, self-tapping AO connect pins available in diameters of 2.0 mm and 3.0 mm.

The pins are offered in various thread lengths and overall lengths.

**Note:** It is advised to use 2.0 mm pins in the hand and larger 3.0 mm pins in the foot and radius.

Half Pin, threaded 2.0 mm × 10 mm × 55 mm	1410-055
Half Pin, threaded 2.0 mm × 10 mm × 75 mm	1410-075
Half Pin, threaded 2.0 mm × 15 mm × 55 mm	1411-055
Half Pin, threaded 2.0 mm × 15 mm × 75 mm	1411-075
Half Pin, threaded 2.0 mm × 20 mm × 75 mm	1412-075
Half Pin, 3.0 mm × 10 mm × 75 mm	1414-075
Half Pin, 3.0 mm × 15 mm × 75 mm	1415-075
Half Pin, 3.0 mm × 15 mm × 100 mm	1415-100
Half Pin, 3.0 mm × 20 mm × 75 mm	1416-075
Half Pin, 3.0 mm × 20 mm × 100 mm	1416-100
Half Pin, 3.0 mm × 20 mm × 140 mm	1416-140
Half Pin, 3.0 mm × 25 mm × 75 mm	1417-075
Half Pin, 3.0 mm × 25 mm × 100 mm	1417-100
Half Pin, 3.0 mm × 25 mm × 140 mm	1417-140

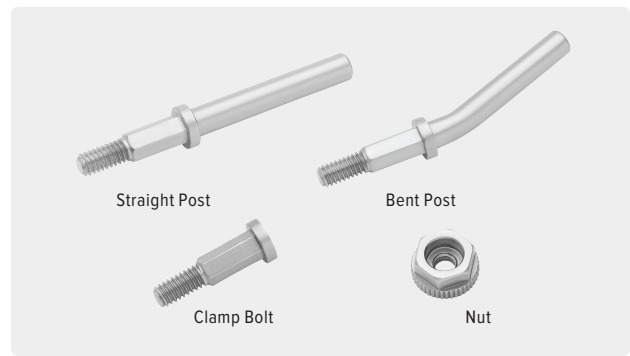


3.0 mm (diameter) × 20 mm (thread length, a) × 100 mm (overall length of pin, b)

### Posts, Nuts, and Bolts

Used with the nut and seats into the 2- and 3-hole multi-pin clamp.

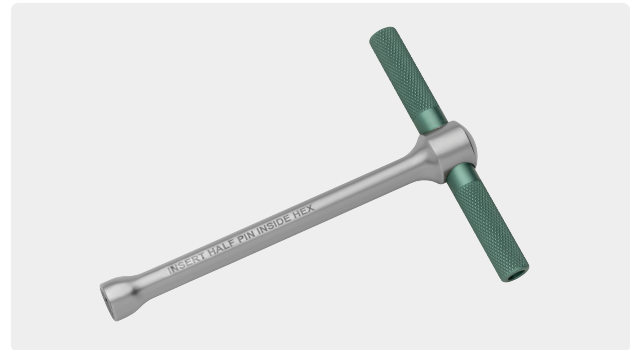
Bent Post	1421-000
Straight Post	1422-000
Nut	1425-000
Clamp Bolt	1423-000



### Large Hex Drive T-Wrench

Compatible with small combination clamps and multi-pin clamp 3/8 interfaces. Inner cannulation compatible with pins to allow insertion by hand.

Large Hex Drive T-wrench	5013
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### Small Hex Drive T-Wrench

Exclusively used to tighten the 3/16 interfaces on the 2- and 3-hole multi-pin clamp.

Small Hex Drive T-wrench	5009
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### Standard Wrench

Compatible with all nuts.

Standard Wrench	AR-8964-07
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### End Cap Screw

Pin caps can be placed over the pins for optional protection.

End Cap Screw (pin cover), 4 pack	1426-000
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### Calibrated Drills

The 1.5 mm drill is used to predrill 2.0 mm pins.  
The 2.0 mm drill is used to predrill 3.0 mm pins.

Calibrated Drill, AO style, 1.5 mm × 110 mm	4001-000
Calibrated Drill, AO style, 2.0 mm × 110 mm	4002-000



### Guide Pin

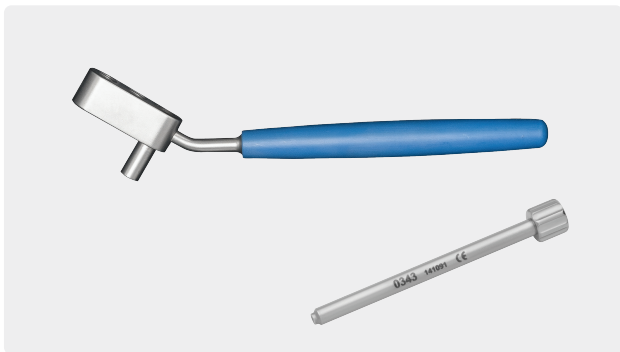
1.5 mm Guide Pin	0109-150
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### Drill Guides

Optional drill guides can be added to lower level of tray.

Multi-pin Clamp Drill Guide	0357-000
Thread-in Sleeve Multi-pin Clamp Drill Guide	0358-000



## Clamps

**Note:** Rods and pins should snap onto the clamps. If the rod does not snap in, slide the pin/clamp onto the construct.

### Single Clamp/Small Combination Clamp

Connects pin to bar or bar to bar; can be tightened with the  $\frac{3}{8}$  wrench.

Small External Fixation Clamp	1400-000
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### Multi-pin Clamp

Used to fixate 2 pins. Can be tightened with the  $\frac{3}{16}$  wrench.

Small Multi-pin Clamp	1406-100
Extension Multi-pin Clamp	1407-100



### Three-pin Multi-pin Clamp

Used to fixate 3 half-pins. Can be tightened with the  $\frac{3}{16}$  wrench.

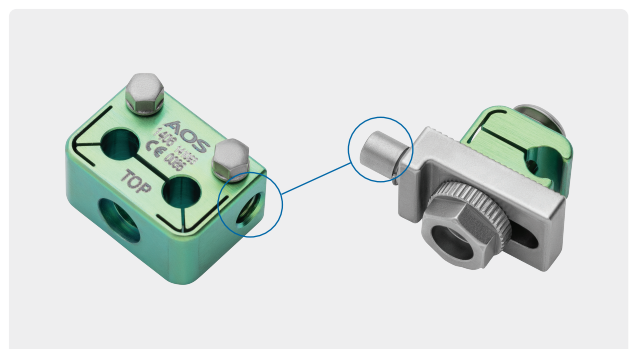
Three-pin Multi-pin Clamp	1409-000
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### Multi-pin Clamp Extension

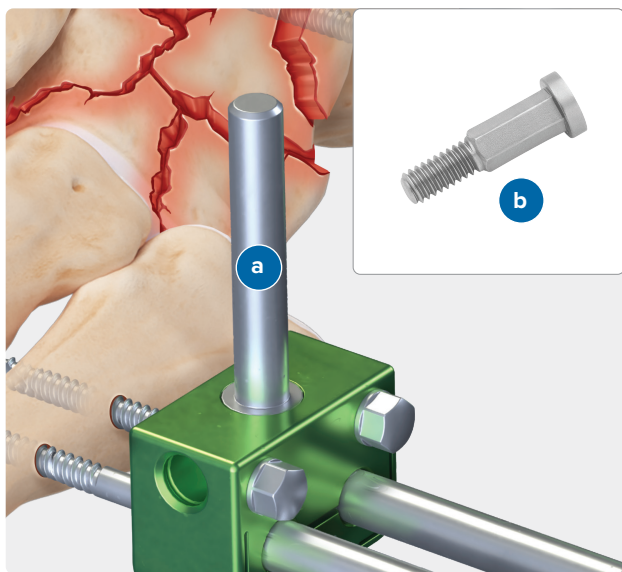
The multi-pin clamp extension can be inserted into the side of multi-pin clamps

Multi-pin Clamp Extension	1407-000
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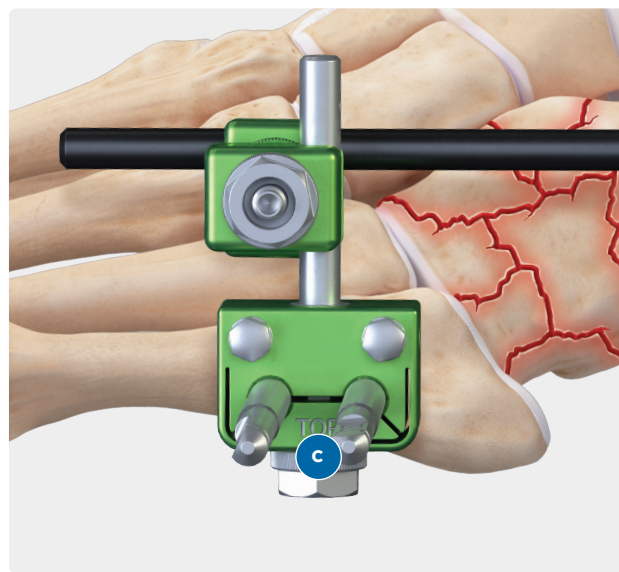


## Assembling the Multi-pin Clamp

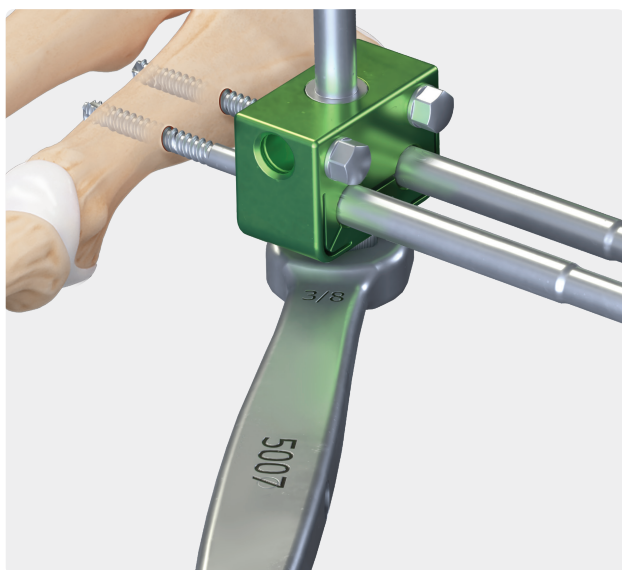
A straight or curved post (a) or clamp bolt (b) and a nut (c) must be used to tighten the pins to the multi-pin clamp.



**1**  
Insert the straight or curved post (a) or clamp bolt (b) into the clamp.



**2**  
Place a nut (c) onto the bottom portion of the post.

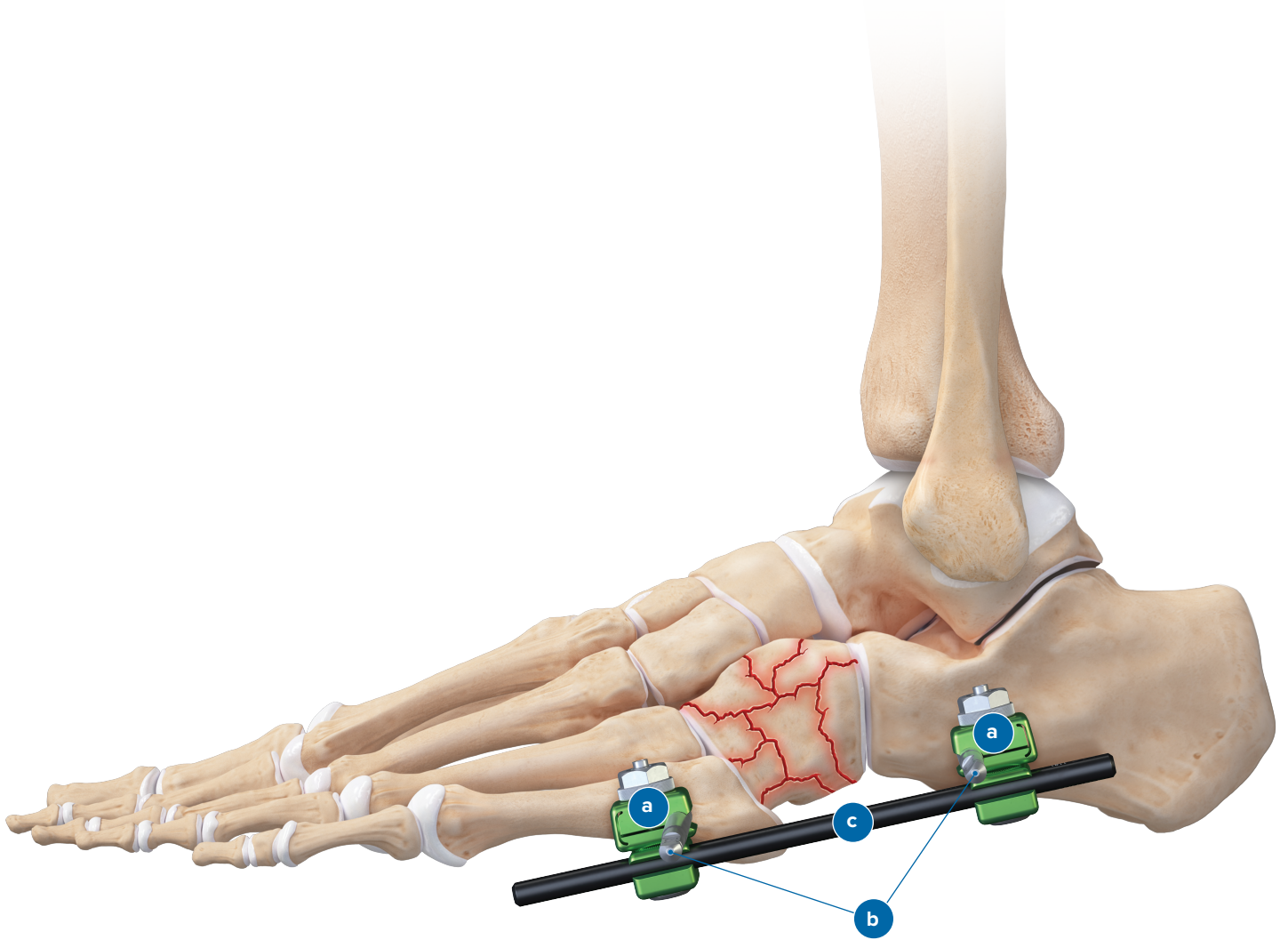


**3**  
Tighten the nut using either the wrench or the large  $\frac{3}{8}$  wrench.

# Applications for Trauma

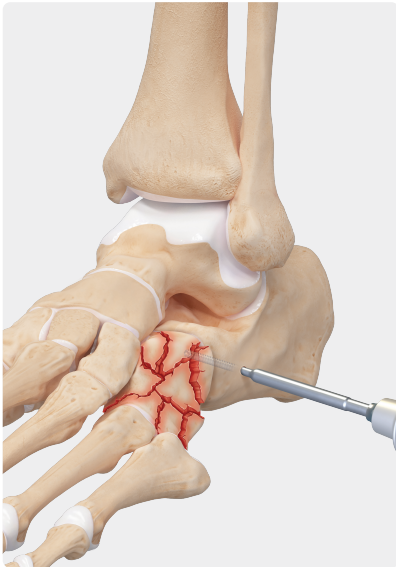
## Supplies Needed

Pic	Product Description	Qty
a	Small Combination Clamp	2
b	Pins, 3.0 mm	2
c	Carbon Fiber Rod	1



## Lateral Column Stabilization Variation 1

**Note:** Constructs will vary based on surgeon preference. Although pins are self-drilling, predrilling is always recommended.



1

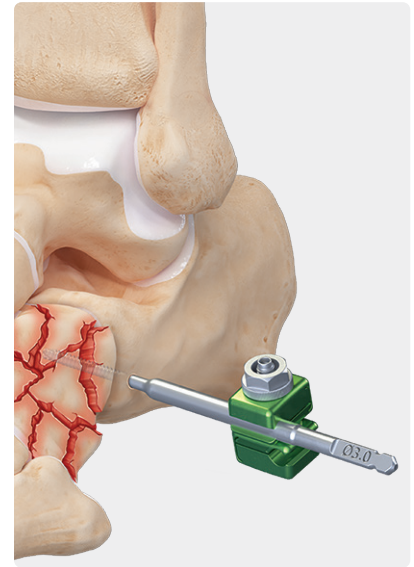
Insert one 3.0 mm pin into the calcaneus.

**Note:** Pin location may vary.



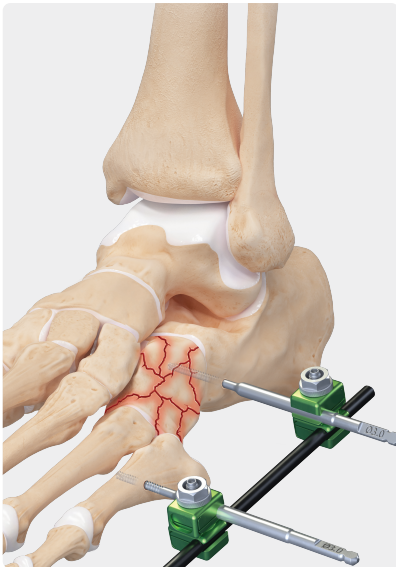
2

Insert second 3.0 mm pin into the metatarsal.



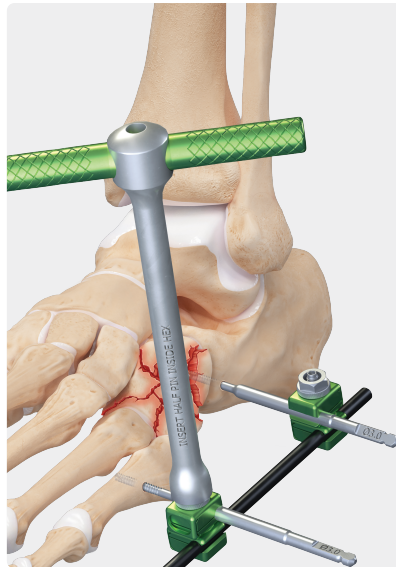
3

Attach a small combination clamp onto each pin.



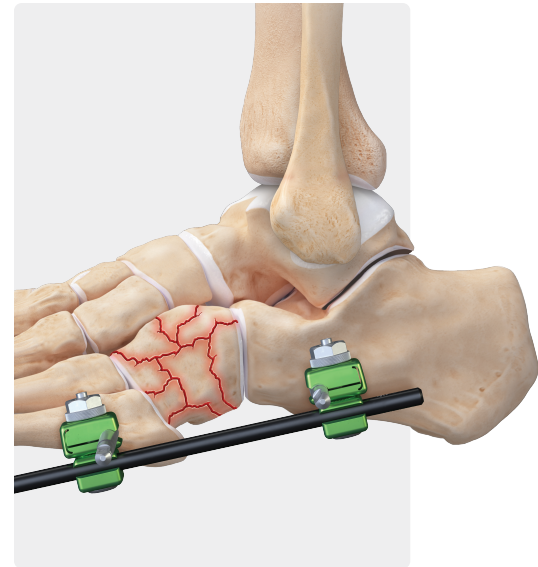
4

Attach a 5.0 mm carbon fiber rod onto the construct.



5

Using the  $\frac{3}{8}$  wrench interface, tighten the small combination clamps.

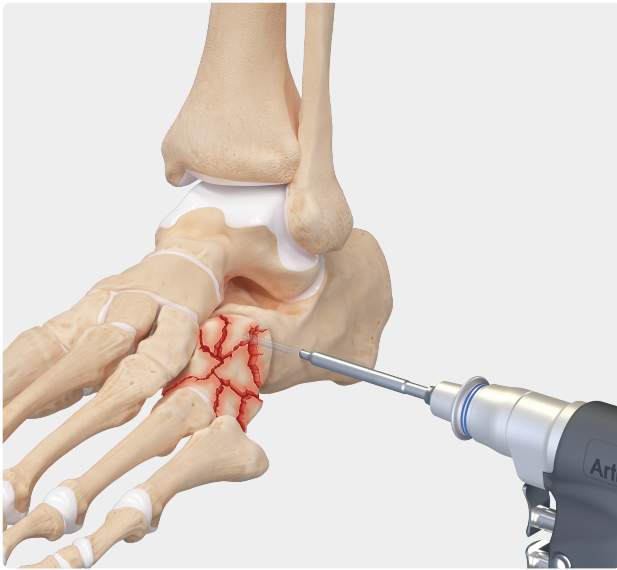


6

Final fixation.

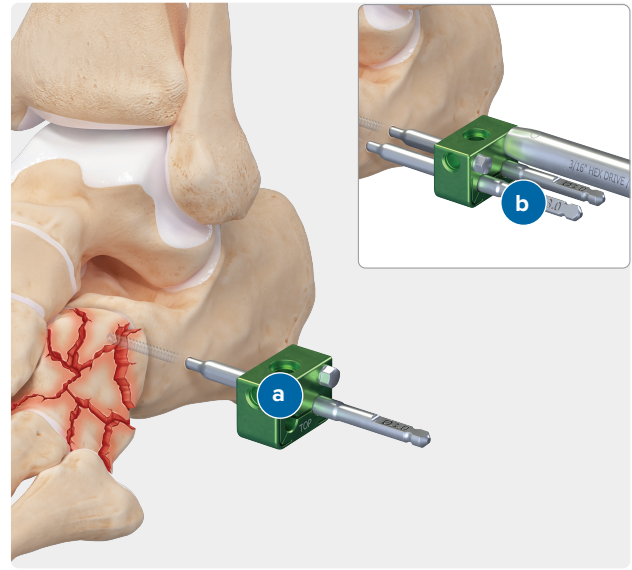
## Lateral Column Stabilization Variation 2

**Note:** Constructs will vary based on surgeon preference. Although pins are self-drilling, predrilling is always recommended.



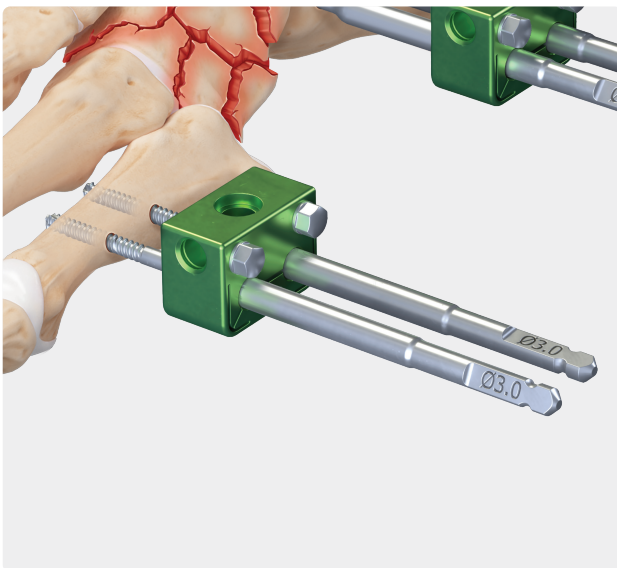
1

Insert one 3.0 mm pin into the calcaneus.



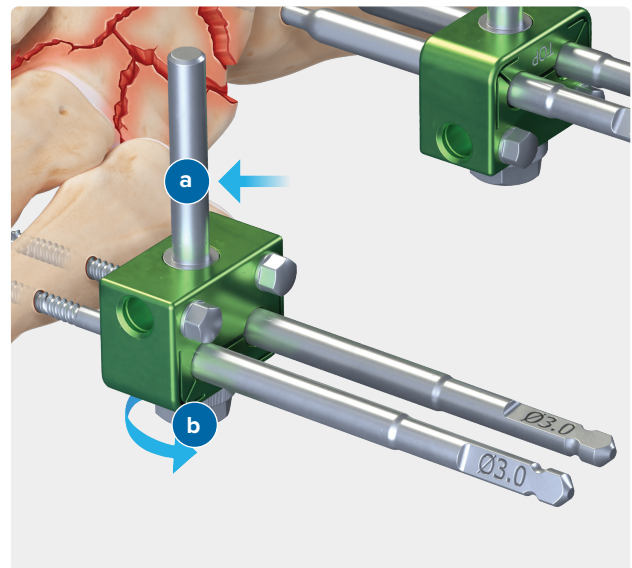
2

Place the multi-pin clamp over the first pin **(a)**. Using the multi-pin clamp as a guide, insert the second pin into the calcaneus **(b)**.



3

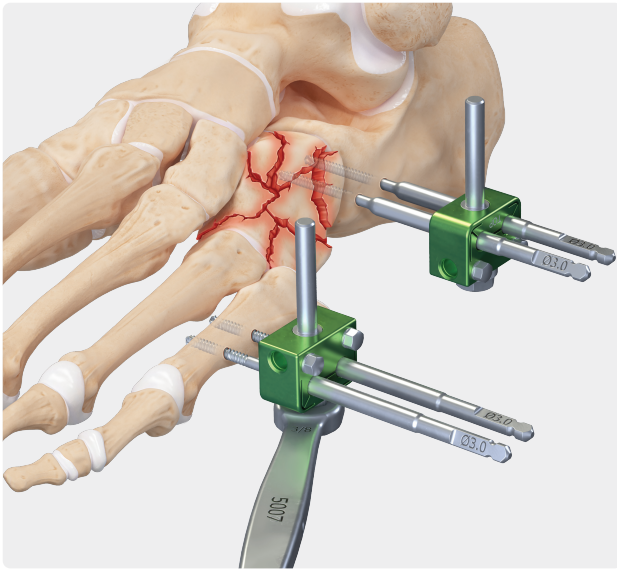
Repeat step 2 with the third and fourth pins in the metatarsal.



4

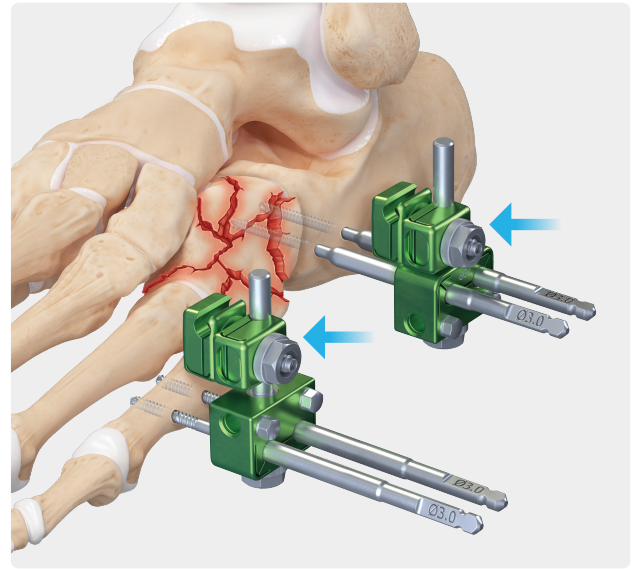
Insert the straight attachment posts onto the top of the multi-pin clamp **(a)**. Then, place the nut at the base of the multi-pin clamp **(b)**.

**Note:** If desired, attach the posts prior to beginning case. For more information on the multi-pin clamp, please see page 6.



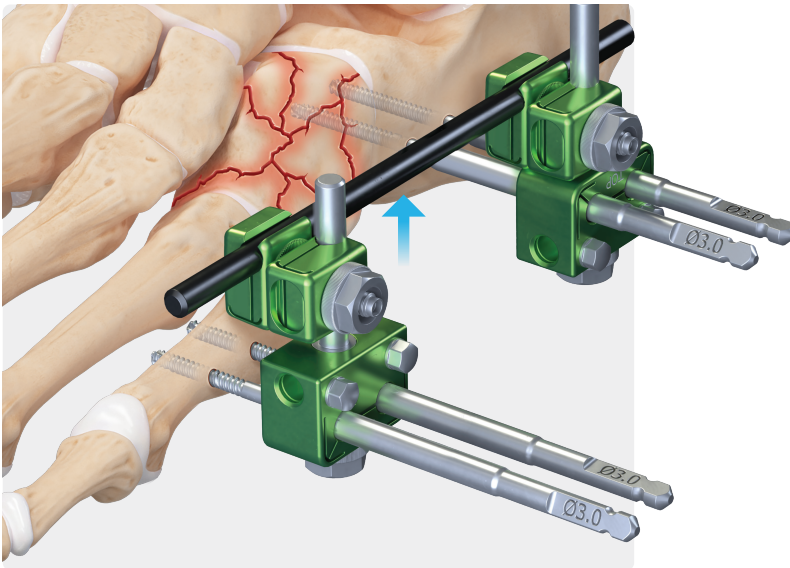
5

Tighten with the large T-handle ( $\frac{3}{8}$ ) wrench.



6

Attach small combination clamps onto both posts.



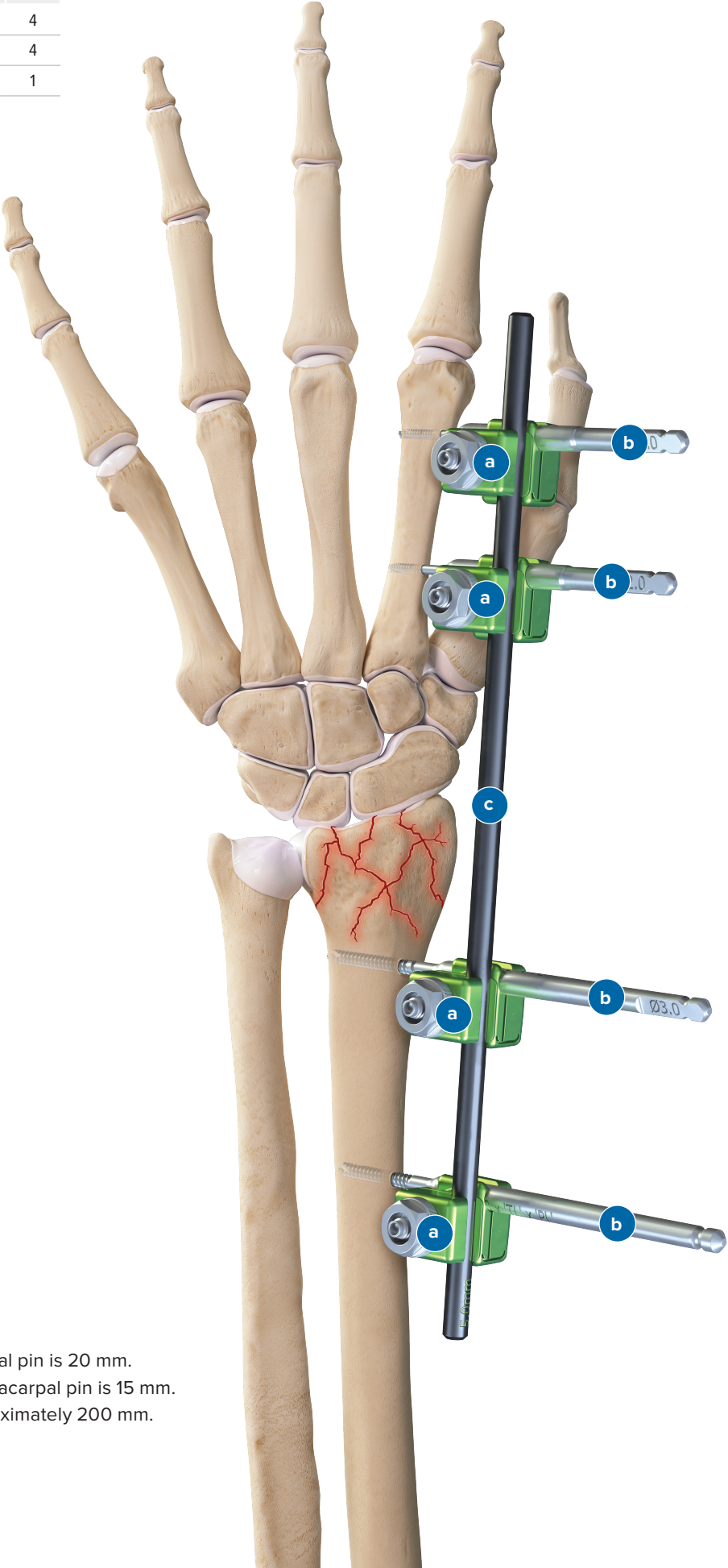
7

Attach one 5.0 mm carbon fiber rod to the combination clamps. Perform final tightening.

# Applications for Distal Radius Fractures

**Supplies Needed**

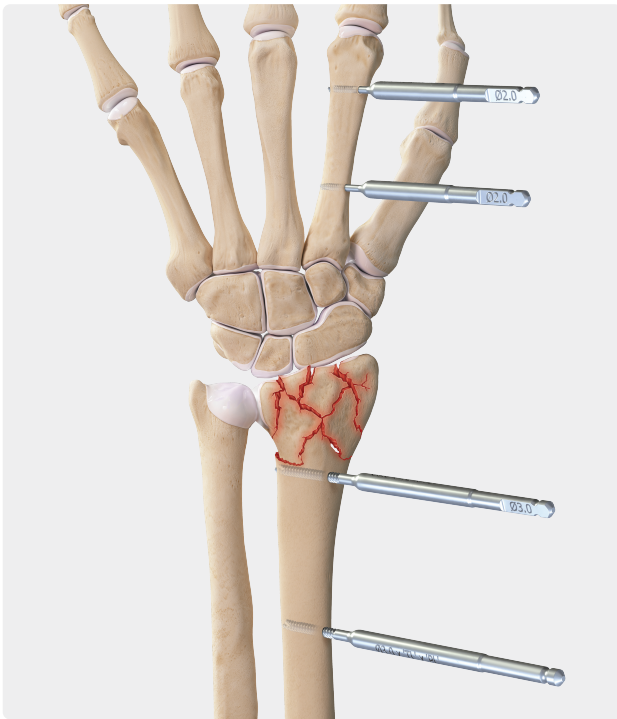
Pic	Product Description	Qty
a	Small Combination Clamp	4
b	Pins (2.0 mm or 3.0 mm)	4
c	Carbon Fiber Rod	1



Typical thread length for a radial pin is 20 mm.  
 Typical thread length for a metacarpal pin is 15 mm.  
 Typical length of a rod is approximately 200 mm.

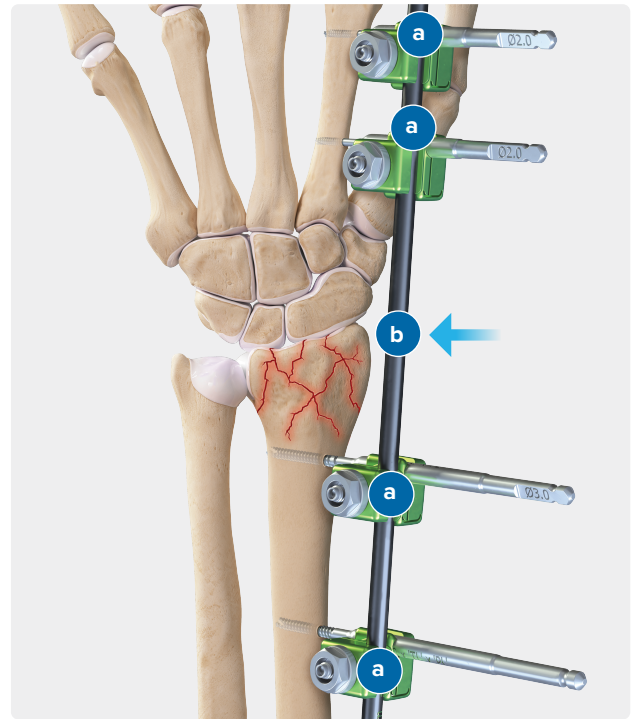
## Distal Radius Fracture Variation 1

**Note:** Constructs will vary based on surgeon preference. Although pins are self-drilling, predrilling is always recommended.



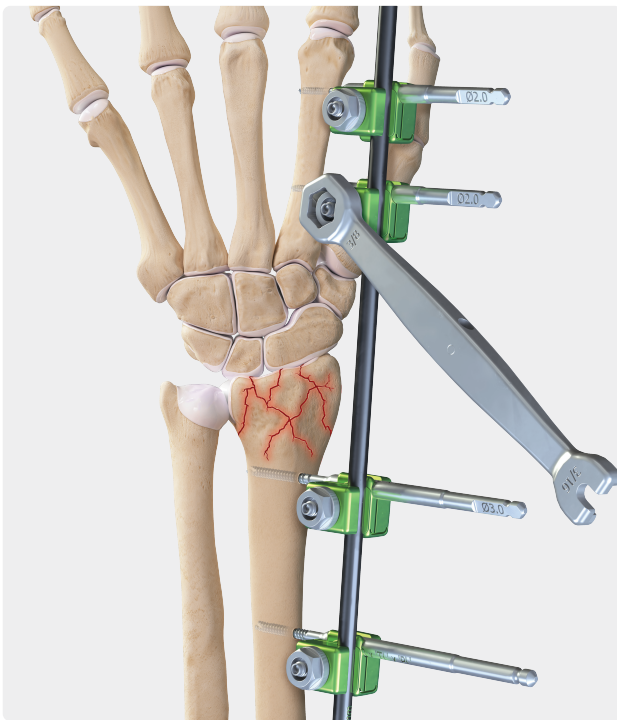
1

Insert 2 pins into the metacarpal and 2 pins into the radius.



2

Place small combination clamps onto each pin (a). Then, attach the pins with one 5.0 mm carbon fiber rod (b).



3

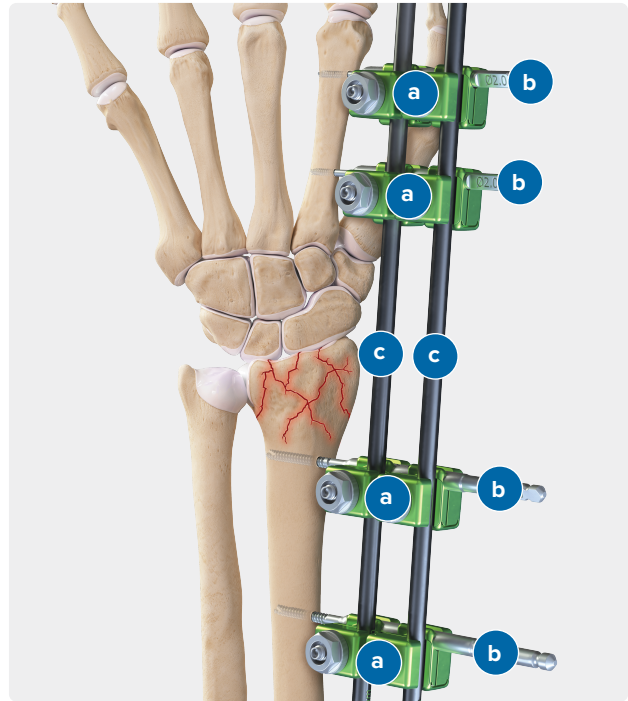
Perform final tightening of all clamps with the 3/8 wrench.

## Distal Radius Fracture Variation 2

### Supplies Needed

Pic	Product Description	Qty
a	Small Combination Clamp	8
b	Pins (2.0 mm or 3.0 mm)	4
c	Carbon Fiber Rod (5.0 mm)	2

**Note:** Constructs will vary based on surgeon preference. Although pins are self-drilling, predrilling is always recommended.

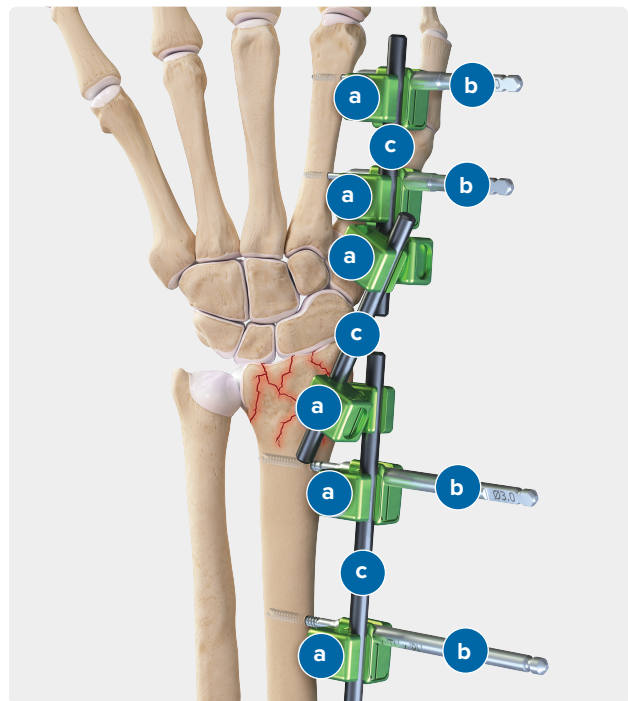


Alternatively, use longer pins and attach two small combination clamps onto each pin. Then connect the construct using two 5.0 mm carbon fiber rods.

## Distal Radius Fracture Variation 3

### Supplies Needed

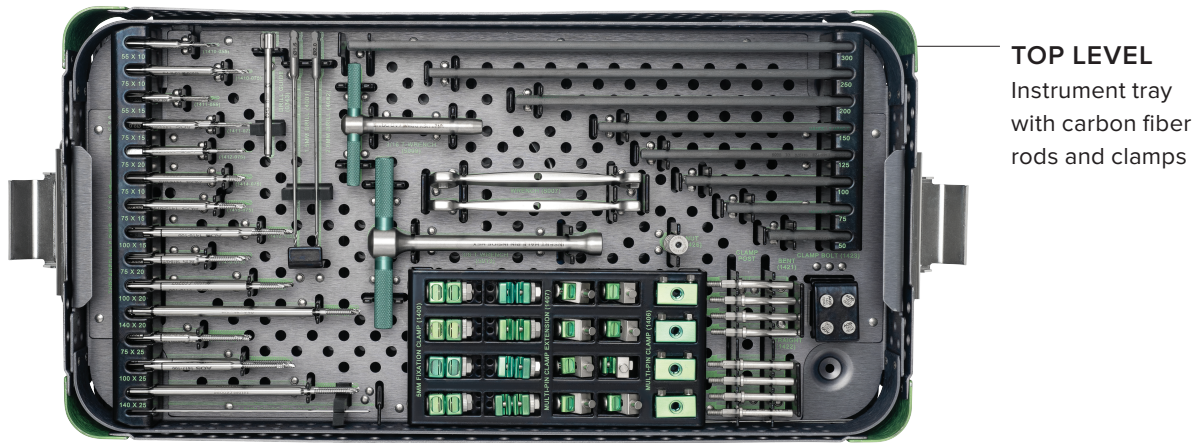
Pic	Product Description	Qty
a	Small Combination Clamp	6
b	Pins (2.0 mm or 3.0 mm)	4
c	Carbon Fiber Rod (5.0 mm)	3



Alternatively, use longer pins and attach two small combination clamps onto each pin. Then connect the construct using three 5.0 mm carbon fiber rods.

## Tray Layout

**Note:** Both levels pictured are included in AR-9933-100.



## Ordering Information

### Small External Fixation System (AR-9933-100S)

Carbon Fiber Rods	
Carbon Fiber Rod, 5.0 mm × 50 mm to 300 mm	1181-050 – 300
Clamps	
5.0 mm Small External Fixation Clamp	1400-000
Two-pin Small Multi-pin Clamp	1406-000
Multi-pin Clamp Extension	1407-000
Three-Pin Small Multi-pin Clamp	1409-000
Threaded Half Pins	
2.0 mm × 10 mm × 55 mm and 75 mm	1410-055 – 075
2.0 mm × 15 mm × 55 mm and 75 mm	1411-055 – 075
2.0 mm × 20 mm × 75 mm	1412-075
3.0 mm × 10 mm × 75 mm	1414-075
3.0 mm × 15 mm × 75 mm and 100 mm	1415-075 – 100
3.0 mm × 20 mm × 75 mm and 140 mm	1416-075 – 140
3.0 mm × 25 mm × 75 mm and 140 mm	1417-075 – 140

Accessories	
Bent Post, multi-pin clamp	1421-000
Straight Post, multi-pin clamp	1422-000
Bolt, multi-pin clamp	1423-000
Small External Fixation System	1425-000
Parallel Fixation Nut	1428-000
1.5 mm Guide Pin	0109-150
Pin Caps (4 pack)	1426-000
Calibrated Drill, AO style, 1.5 mm × 110 mm	4001-000
Calibrated Drill, AO style, 2.0 mm × 110 mm	4002-000
Drill Guide, 1.5 mm to 2 mm	0343-000
Wrench, AO, 3/8 in - 3/16 in	5007-000
Small Hex Drive T-wrench, 3/16 in	5009-000
Large Hex Drive T-wrench, 3/8 in	5013-000
Thread-in Sleeve	0357-000
T-handle Wrench, 3/8 in	0358-000



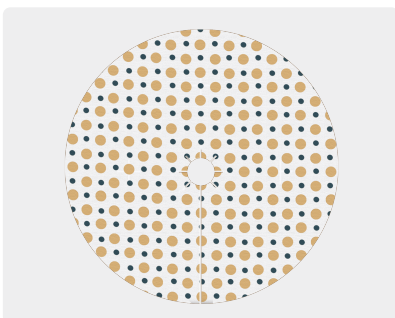
**JumpStart® Pin Site Dressing Kit for External Fixation**

Featuring V.Dox™ technology, JumpStart antimicrobial wound dressing includes an embedded dot matrix of elemental silver and zinc microbatteries that preserve the naturally produced electrical currents of the skin that are essential for healing. In the presence of a conductive fluid such as wound exudate, water-based wound hydrogel, saline, or water, JumpStart dressing's microcurrents minimize and prevent the growth of a broad spectrum of bacteria.<sup>1-3</sup>

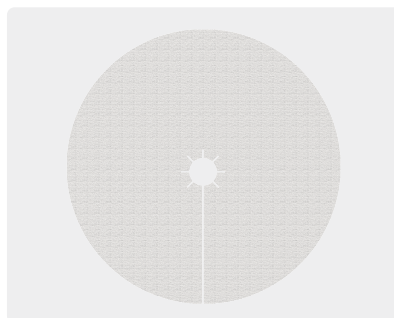
The JumpStart pin site dressing kit is intended for the management of wounds and is indicated for partial-thickness wounds (those involving the epidermis and dermis) and full-thickness wounds (those involving the dermis, subcutaneous fat, and sometimes bone), including external fixation pin sites and surgical incisions. The JumpStart pin site kit allows surgeons to focus on the procedure at hand rather than the worry of infection, Helping Surgeons Treat Their Patients Better™.

- › Pin-tract infection (PTI) is the most common complication in external fixation procedures<sup>4</sup>
- › These infections create a significant burden for the patient and health care system, including an increased number of clinic visits, the possible need for additional surgery, and compromised patient outcomes<sup>5</sup>
- › *Staphylococcus epidermidis*, *Staphylococcus aureus*, and *Escherichia coli* are the three most common infective agents of external fixation constructs. JumpStart dressing's antimicrobial properties impact all three.<sup>4</sup>

**Kit Components**



**JumpStart Antimicrobial Wound Dressing**  
Broad-spectrum antimicrobial wound contact layer



**Absorbent Disk**  
Polyester-based absorbent layer



**Holding Clip**  
Keeps the dressings in place and helps maintain a moist wound environment

| **Note:** Product is not made with natural rubber latex.

### Mini Joint Distractor/Compressor

Can be used in addition to the small ex-fix to provide distraction and compression. This distractor is compatible with 1.6 mm and 2.4 mm guidewires and 3.0 mm pins. Included in the comprehensive fixation system (CFS) set.

Mini Joint Distractor/Compressor	AR-8970JD
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### ArthroFX® External Fixation System

The ArthroFX large external fixation system was designed to give surgeons a simple, efficient, and cost-effective solution for temporary or definitive fixation.

#### The system consists of:

- > 11 mm carbon fiber rods
- > 6.0 mm transfixation pins
- > 4.0 mm and 5.0 mm Schanz pins
- > Large combination clamps and multi-pin clamps with rod attachments



#### ArthroFX External Fixation System (AR-8964S)

Instruments	
Drill Guide Handle	AR-8964-17
Universal Chuck w/ T-handle	AR-8964-20
Ratchet Wrench, 11 mm, qty. 2	AR-8964-21
Multi-Driver Adapter, qty. 2	AR-8964-19
Six-Position Drill Guide Handle	AR-8964-18
Trocar, long, 3.5 mm, qty. 2	AR-8964-16
Trocar, short, 3.5 mm, qty. 2	AR-8964-15
Drill Sleeve, long, 3.5 mm, qty. 2	AR-8964-12
Drill Sleeve, short, 3.5 mm, qty. 2	AR-8964-11
Drill Sleeve, threaded, long, 5.0 mm, qty. 2	AR-8964-14
Drill Sleeve, threaded, short, 5.0 mm, qty. 2	AR-8964-13
Multi-driver w/ T-handle	AR-8964-23
ArthroFX Case	AR-8964C
Disposables	
Drill Bit, 3.5 mm	AR-8964-10

Implants/Instruments (to be ordered separately)	
Large Combination Clamp, qty. 24	AR-8964-07
Multi-pin Clamp, large, qty. 2	AR-8964-08
Rod Attachment, large multi-pin clamp, qty. 4	AR-8964-09
Attachment Arm, straight, qty. 4	AR-8964-27
Carbon Fiber Rod, 11 mm × 100 mm, qty. 4	AR-8964R-100
Carbon Fiber Rod, 11 mm × 150 mm, qty. 4	AR-8964R-150
Carbon Fiber Rod, 11 mm × 200 mm, qty. 4	AR-8964R-200
Carbon Fiber Rod, 11 mm × 250 mm, qty. 4	AR-8964R-250
Carbon Fiber Rod, 11 mm × 300 mm, qty. 4	AR-8964R-300
Carbon Fiber Rod, 11 mm × 350 mm, qty. 4	AR-8964R-350
Carbon Fiber Rod, 11 mm × 400 mm, qty. 4	AR-8964R-400
Carbon Fiber Rod, 11 mm × 450 mm, qty. 4	AR-8964R-450
Carbon Fiber Rod, 11 mm × 500 mm <sup>9</sup> , qty. 4	AR-8964R-500
Schanz Pin, 4.0 mm × 125 mm, qty. 4	AR-8964-01
Schanz Pin, 4.0 mm × 150 mm, qty. 4	AR-8964-02
Schanz Pin, 5.0 mm × 175 mm, qty. 4	AR-8964-03
Schanz Pin, 5.0 mm × 200 mm, qty. 4	AR-8964-04
Schanz Pin, 5.0 mm × 250 mm, qty. 4	AR-8964-24
Transfixation Pin, 6.0 mm × 225 mm, qty. 3	AR-8964-05
Transfixation Pin, 6.0 mm × 300 mm, qty. 3	AR-8964-06
End Cap Screws, qty. 20	AR-8964-22

**Note:** Quantities reflect the amounts included in AR-8964I and AR-80964S.

## References

1. Kim H, Makin I, Skiba J, et al. Antibacterial efficacy testing of a bioelectric wound dressing against clinical wound pathogens. *Open Microbiol J.* 214;8:15-21. doi:10.2174/18742858014080100152
2. Banerjee J, Das Ghatak P, Roy S, et al. Silver-zinc redox-coupled electroceutical wound dressing disrupts bacterial biofilm. *PLoS One.* 2015;10(3):e0119531. doi:10.1371/journal.pone.0119531
3. Kim H, Izadjoo MJ. Antibiofilm efficacy evaluation of a bioelectric dressing in mono- and multi- species biofilms. *J Wound Care.* 2015;24(Suppl 2):S10-S14. doi:10.12968/jowc.2015.24.Sup2.S10
4. Ceroni D, Grumetz C, Desvachez O, Pusateri S, Dunand P, Samara E. From prevention of pin-tract infection to treatment of osteomyelitis during paediatric external fixation. *J Child Orthop.* 2016;10(6):605-612. doi:10.1007/s11832-0160787-8
5. Kazmers NH, Fragomen AT, Rozbruch SR. Prevention of pin site infection in external fixation: a review of the literature. *Strategies Trauma Limb Reconstr.* 2016;11(2):75-85. doi:10.1007/s11751-016-0256-4



This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's directions for use. Postoperative management is patient-specific and dependent on the treating professional's assessment. Individual results will vary and not all patients will experience the same postoperative activity level or outcomes.



Arthrex manufacturer, authorized representative, and importer information (Arthrex eIFUs)



US patent information