EXACTECH | **EXTREMITIES**

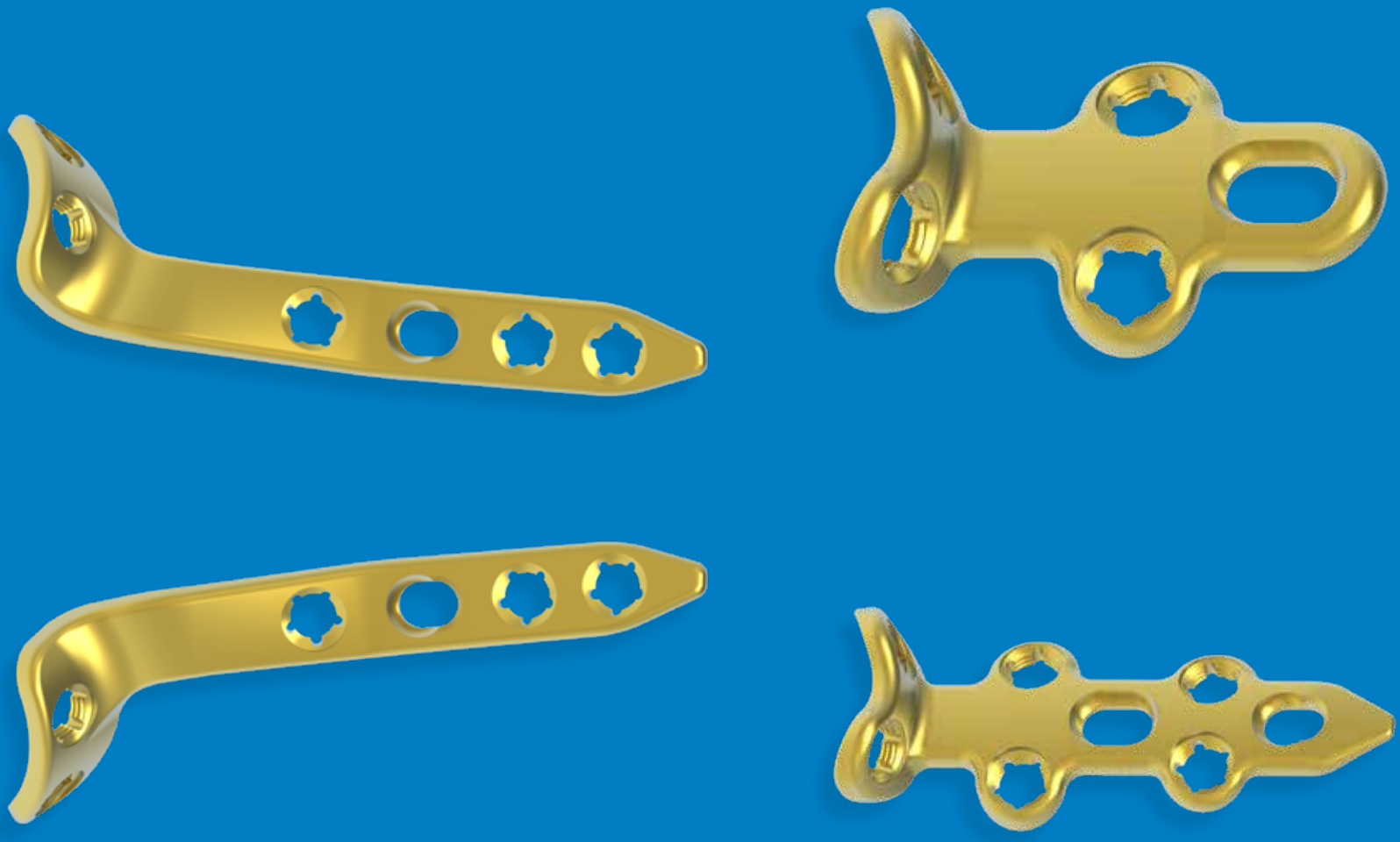
Operative Technique

EPIC EXTREMITY

Ankle Fusion Plating System

exactech

TABLE OF CONTENTS



ANTERIOR TIBIOTALAR ARTHRODESIS (ANTERIOR TT)

DETAILED OPERATIVE TECHNIQUE

Figure 1
Make Incision

Figure 2
Remove Osteophytes, Cartilage and Subchondral Bone

Figure 3
Fixate Tibiotalar Joint

Figure 4
Determine Appropriate Anterior TT Plate

ANTERIOR TIBIOTALAR ARTHRODESIS (ANTERIOR TT)

Make a standard, longitudinal incision over the anterior ankle *(Figure 1)*. Standard technique should be used to debride the cartilage and subchondral bone. Remove all osteophytes from the anterior ankle to allow application of the plate and align the ankle joint such that the ankle is neutral with respect to dorsiflexion and plantarflexion *(Figure 2)*. Specifically, the foot should be approximately 5-10° of external rotation and 5° of hindfoot valgus. The talus should be posteriorly displaced under the tibia.

⏭ SURGICAL PEARL

Surgeon should consider passing an osteotome down the medial and lateral gutters to release the ligamentous structures.

Use one or two k-wires to fixate the tibiotalar joint, as preferred *(Figure 3)*, then use a rongeur or saw to debride irregular surface remaining over the anterior joint.

⏭ SURGICAL PEARL

Surgeon should consider removing the lateral one third of the medial malleolus with an oscillating saw in order to displace the talus medially to avoid impingement.

Determine appropriate anterior TT plate based on patient's anatomy *(Figure 4)*.

Note: *For best plate position and fit, some of the distal anterior metaphyseal flare may need to be resected. This holds true for the dorsal talar neck to allow appropriate plate fit.*

Figure 5
Secure Plate with Olive Pins

Figure 6
Drill Plate Hole

Figure 7
Assess Screw Length

On the A/P view, the plate should be centered on the tibia. On the lateral view, the plate should not impinge on the talonavicular joint.

⏭ SURGICAL PEARL

The surgeon should dorsiflex and plantarflex the foot to see if talonavicular impingement is occurring. If impingement occurs, the surgeon can remove the anterior portion of the distal tibia or displace the talus anteriorly.

Secure plate using a **2.0 Threaded Olive Pin** in the proximal hole on the tibia and a 2.0 Threaded Olive Pin in the lateral talar neck hole *(Figure 5)*. Confirm plate position using fluoroscopy, pick the **Screw Locking Drill Guide** and thread into the lateral talar body screw hole.

⏭ SURGICAL PEARL

If the surgeon prefers, two screws can be inserted across the joint using the 1.6 mm Non-Threaded Guidewire fixating the joint.

Drill using the **Solid Drill Bit**. Drill bit comes in sizes 3.1 or 4.1mm depending upon size of the screws (either 4.5 or 5.5mm). *(Figure 6)*.

Remove Drill Guide and use the **Depth Gauge** to assess screw length *(Figure 7)*.

Note: *Screw length can be determined by direct read or by using the Depth Gauge.*

DETAILED OPERATIVE TECHNIQUE

Figure 8
Install Non-Locking Screw Into Tibial Slot and Remove Olive Pin

Figure 9
Install Non-Locking Screw Into Compression Slot

Figure 10
Install Locking Screws Into Tibial Holes

Figure 11
Final Implant

The surgeon has the option of locking or non-locking screws to further seat the plate. After the talus is locked in place, drive a non-locking screw into the proximal slot of the anterior plate. This allows for axial compression without significant malrotation in the varus/valgus direction.

Note: *Compression of the joint can be achieved through the use of the proximal compression slot or by inserting the crossing screws over the k-wires.*

Insert the selected screw size into the plate hole using the screwdriver and handle or by power *(Figure 8)*.

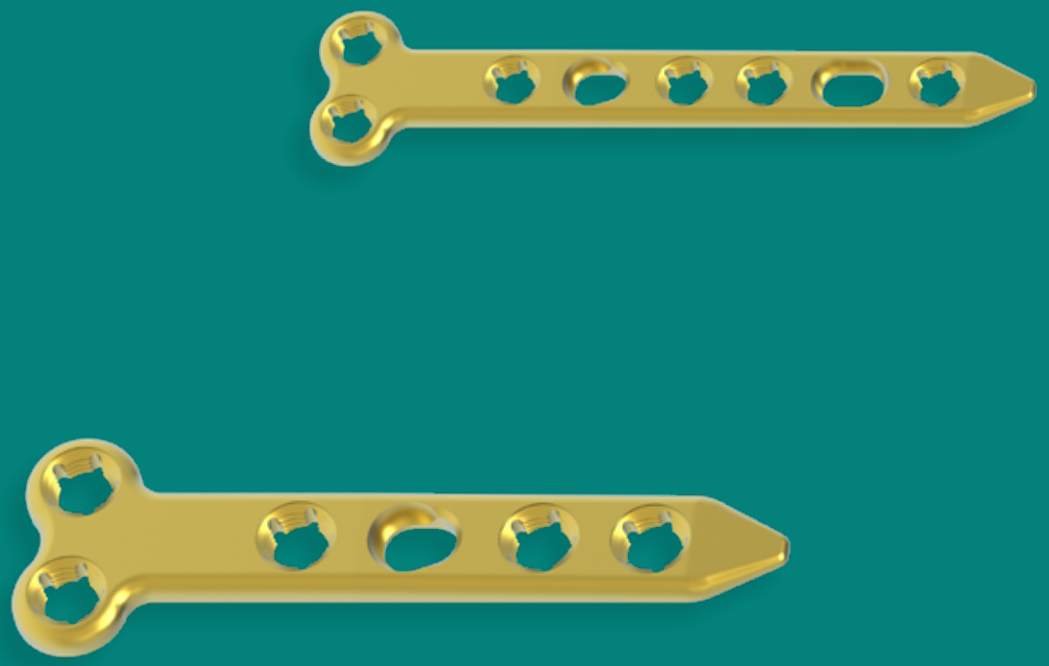
Note: *It is recommended that distal fixation is achieved before the proximal holes in the tibia are filled and always prior to using the compression slot.*

Install a non-locking screw in the tibial compression slot *(Figure 9)*.

Note: *The central hole in the plate can be used to further secure the plate to the bone.*

Note: *In instances where a cross-joint compression screw is not used, compression through the compression slot of the plate can be significant and result in more dorsiflexion than desired. Careful attention should be paid to the position of the ankle joint throughout the procedure.*

Continue installing locking screws into the remaining proximal tibal holes until complete *(Figure 10)*.



LATERAL TIBIOTALAR ARTHRODESIS (LATERAL TT)

Figure 1
Make Incision

Figure 2
Place K-Wire across the Tibiotalar Joint, Place Plate, and Fixate with Olive Pins

LATERAL TIBIOTALAR ARTHRODESIS (LATERAL TT)

A standard, lateral incision is made over the posterior half of the fibula beginning proximal to the tip of the fibula and curving anterior distally toward the fourth metatarsal just past the tip of the fibula *(Figure 1)*.

Resect the distal fibula to make appropriate room for the lateral plate.

Remove any anterior osteophytes that may interfere with the joint reduction. With the foot and ankle held in alignment, use a K-wire to temporarily fix the tibiotalar joint. Place the appropriate lateral plate in the correct anatomic position across the ankle joint *(Figure 2)*. Fix plate in position using two 2.0 mm Threaded Olive Pins; it is recommended to place one pin in the tibia and one in the talus.

Figure 3
Fixate Talar Plate Holes with Locking Screws

Figure 4
Install Non-Locking Screw in Proximal Compression Slot

Figure 5
Insert Crossing Screw Across the Tibiotalar Joint

Fixate one of the talar plate holes using a locking screw *(Figure 3)*. Remove the distal fixation pin and repeat for the remaining talar hole.

Note: *It is recommended that distal fixation is achieved before the proximal holes are filled and always prior to using the compression slot.*

Remove the proximal fixation pin and install a non-locking screw in the compression slot *(Figure 4)*. When using the long version of the plate, the second compression slot maybe utilized for additional compression. A crossing screw can be placed across the tibiotalar joint *(Figure 5)*.

Figure 6
Install Locking Screws Into Tibial Holes

Figure 7
Final Implant

Note: *In instances where a cross-joint compression screw is not used, compression through the compression slot of the plate can be significant and result in a valgus position of the ankle joint if not considered. Careful attention should be paid to the position of the ankle joint throughout the procedure.*

Install remaining locking screws into the tibial plate holes *(Figure 6)*.

LATERAL TIBIOTALOCALCANEAL ARTHRODESIS (LATERAL TTC)

Figure 1
Make Incision

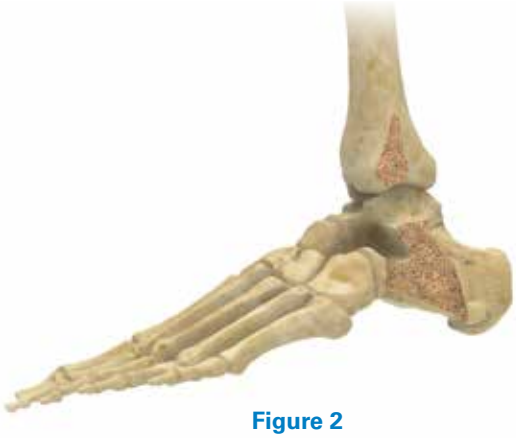


Figure 2
Resect Distal Fibula and Remove Osteophytes

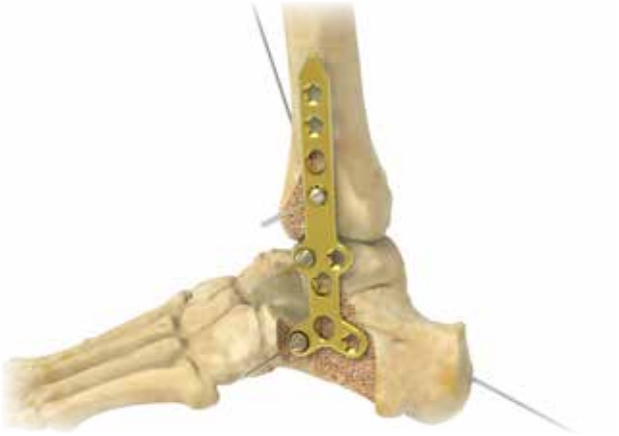


Figure 3
Place K-wires through the Tibiotalar and Subtalar Joints and Fixate Plate with Olive Pins

LATERAL TIBIOTALOCALCANEAL ARTHRODESIS (LATERAL TTC)

A standard lateral incision is made over the posterior half of the fibula beginning proximal to the tip of the fibula extending distally to the plantar aspect of the calcaneus *(Figure 1)*.

Resect the distal fibula to make appropriate room for the lateral plate. Remove any osteophytes on the lateral aspect of the calcaneus and talus to allow the plate to sit flush against the bone *(Figure 2)*.

With the foot and ankle held in alignment, use K-wires to fix the tibiotalar and subtalar joint. Place the appropriate lateral plate in the correct anatomic position across the ankle joint and fixate using three 2.0mm Threaded Olive Pins *(Figure 3)*. The recommended pin locations are in the most distal tibial screw hole location and the most anterior calcaneal hole and the anterior talar hole.

Figure 4
Assess and Fixate Talar Plate Holes with Locking Screws

Figure 5
Place Crossing Screws

Assess and fixate the talus with locking screws *(Figure 4)*. Insert a non-locking screw into the tibial compression slot. Next, insert a screw across the tibiotalar joint. Remove that K-wire across the tibiotalar joint. Insert a screw across the subtalar joint and remove the K-wire fixation *(Figure 5)*.

Note: *It is recommended that distal fixation is achieved before the proximal holes are filled and always prior to use the compression slot.*

DETAILED OPERATIVE TECHNIQUE

Figure 6
Insert Non-locking Screw into Tibial Compression Slot

Figure 7
Insert Locking Screws Into the Calcaneus and Non-Locking Screws Into the Compression Slots

Figure 8
Insert Locking Screws Into the Remaining Tibial Holes from Distal to Proximal

Figure 9
Final Implant

Finally, install locking screws into the tibial and calcaneal holes working from distal to proximal *(Figures 6 - 9)*.

The second compression slot in the longer version plate may be utilized for additional compression across the tibiotalar joint.

Note: *In instances where a cross-joint compression screw is not used, compression through the compression slot of the plate can be significant and result in a valgus position of the ankle joint if not considered. Careful attention should be paid to the position of the ankle joint throughout the procedure.*

Figure 1
Make Incision

Figure 2
Place Provisional Fixation Wire Through Tibiotalar Joint Posterolateral to Anteromedial

Figure 3
Remove Osteophytes and Secure Posterior Plate with Olive Pins

POSTERIOR TIBIOTALAR ARTHRODESIS (POSTERIOR TT)

A prone position should be utilized for this approach, with the foot and ankle extending off the end of the table to allow for a neutral foot position to be achieved. A longitudinal midline, full-thickness incision is made over the posterior tibiotalar joint centered over the Achilles tendon, beginning proximal to the ankle joint and terminating at the superior aspect of the calcaneus *(Figure 1)*.

A provisional fixation wire should be placed in the posterolateral to anteromedial direction through the tibiotalar joint *(Figure 2)*. Remove any osteophytes to allow the plate to sit flush against the bone. Place appropriate posterior plate in the correct anatomic position across the ankle joint and fixate using two 2.0 mm Threaded Olive Pins *(Figure 3)*. It is recommended to place one pin in the tibia and one in the talus.

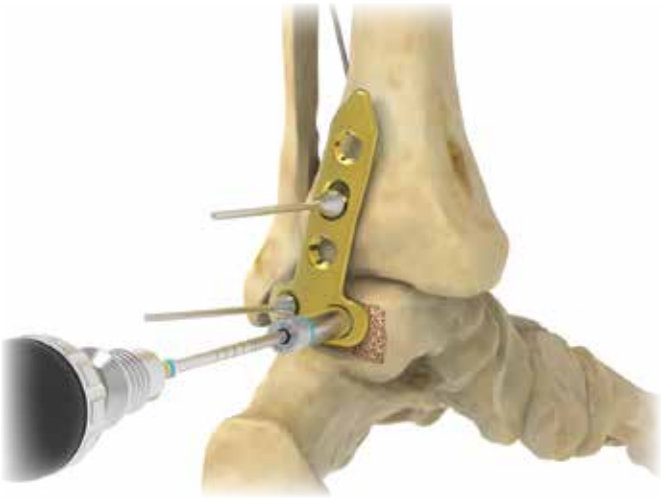


Figure 4
Assess and Fixate Talar Plate Holes

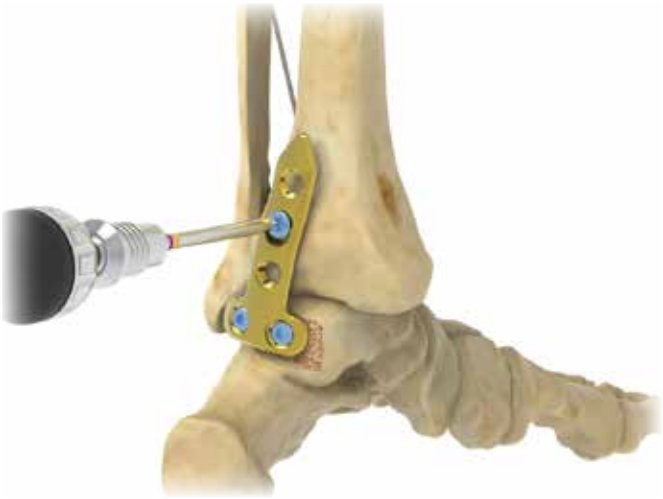


Figure 5
Install Non-Locking Screw Into Compression Slot

Fixate the talar plate holes using a locking screws *(Figure 4)*.

Remove the proximal Olive Pin and install a non-locking screw in the compression slot *(Figure 5)*. Install a crossing screw across the tibiotalar joint and remove the K-wire.

Figure 6
Install Locking Screws in the Tibial Holes

Figure 7
Final Implant

Install locking screws in the remaining two holes of the tibia working distal to proximal *(Figure 6)*.

Note: *It is recommended that distal fixation is achieved before the proximal holes are filled and always prior to using the compression slot.*

DETAILED OPERATIVE TECHNIQUE

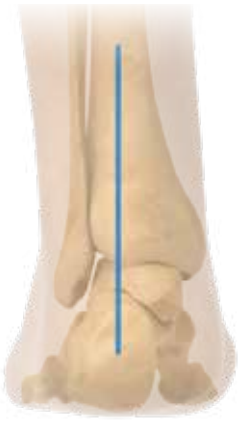


Figure 1
Make Incision

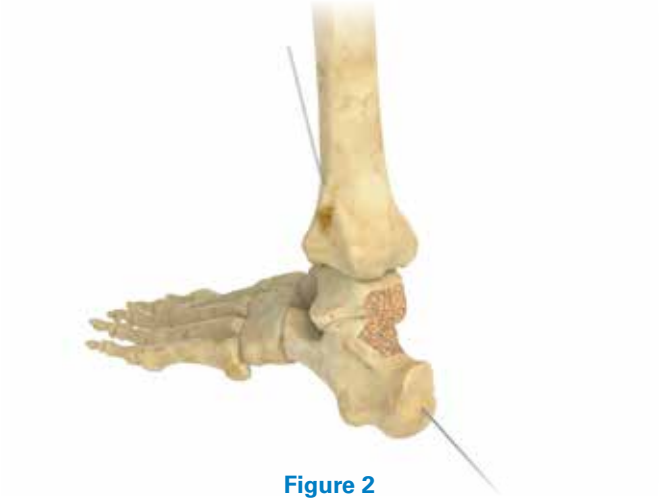


Figure 2
Remove Osteophytes and Place Fixation Wires

Figure 3
Place Posterior Plate

Figure 4
Fixate with Olive Pins

POSTERIOR TIBIOTALOCALCANEAL ARTHRODESIS (POSTERIOR TTC)

A prone position should be utilized for this approach, with the foot and ankle extending off the end of the table to allow for a neutral foot position to be achieved. A longitudinal midline, full-thickness incision is made over the posterior tibiotalar joint centered over the Achilles tendon, beginning proximal to the ankle joint and made to allow for access to the subtalar joint *(Figure 1)*.

A capsulotomy is made to expose the posterior tibiotalar and subtalar joints. Remove any osteophytes on the tibia, talus, and calcaneus to allow for exposure to the tibiotalar and subtalar joints *(Figure 2)*.

Place provisional fixation wires in the posterolateral to anteromedial direction for the tibiotalar joint, and posterior to anterior direction for the subtalar joint.

Place the appropriate posterior plate in the correct anatomic position across the ankle joint and fixate in position using two 2.0 mm Threaded Olive Pins *(Figures 3 and 4)*. The recommended pin locations are in the most distal tibial screw hole and the lateral talar hole.

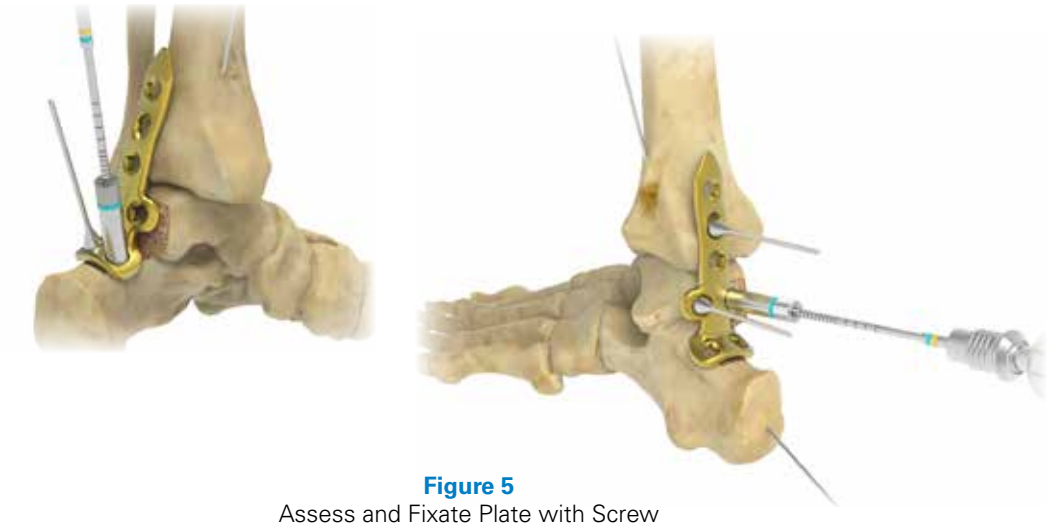


Figure 5
Assess and Fixate Plate with Screw

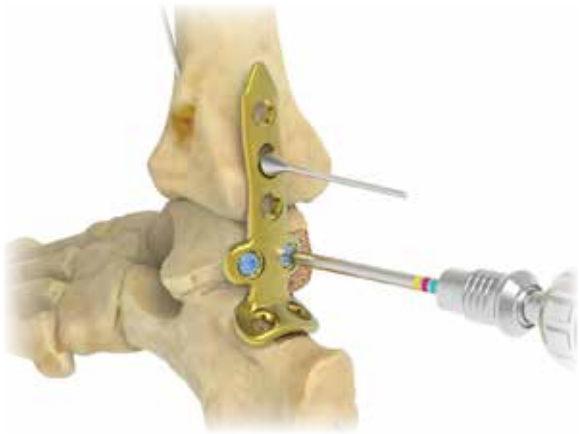


Figure 6
Remove Distal Fixation Pins and Insert Screws

Figure 7
Install Non-Locking Screw Into the Compression Slot

Assess screw depth for talar plate holes and then fixate plate holes using a locking screw *(Figure 5)*.

Note: *It is recommended that distal fixation is achieved before the proximal holes are filled and always prior to using the compression slot.*

Repeat in two talar holes. Continue to install screws through the remaining tibial holes until desired fixation is achieved *(Figure 6)*.

DETAILED OPERATIVE TECHNIQUE

Figure 8
Place Screw Across the Tibiotalar Joint

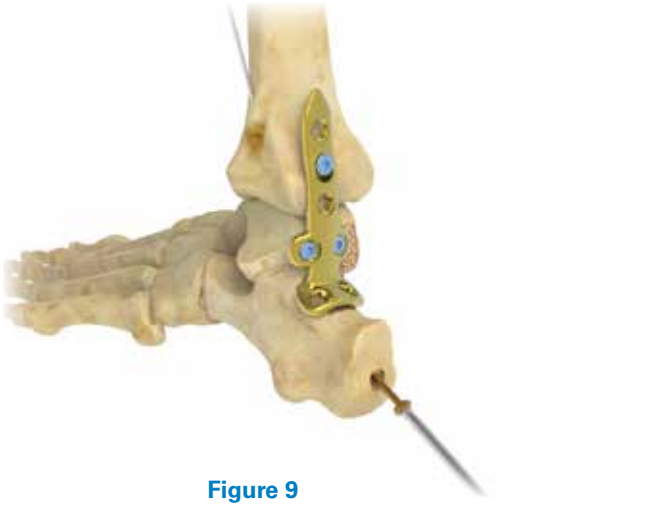


Figure 9
Place Screw Through the Subtalar Joint Posteriorly to Anteriorly

Figure 10
Install Locking Screws Into Tibial Holes

Figure 11
Final Implant

Install a non-locking screw in the proximal compression slot *(Figure 7)*. Place a crossing screw from posterolateral to anteromedial into the tibiotalar joint *(Figure 8)*. Then place a crossing screw from posterior to anterior through the subtalar joint *(Figure 9)*. Finally, install locking screws in the remaining holes in the calcaneus and tibia, working distal to proximal *(Figure 10)*.

Note: *In instances where a cross-joint compression screw is not used, compression through the compression slot of the plate can be significant and result in more plantarflexion than desired if not considered. Careful attention should be paid to the position of the ankle joint throughout the procedure.*

Figure 1
View Drill Bit Etch to Determine Screw Length

Screw Diameter	Drill Item Number	Drill Guide Item Number	Cone Drill Guide Item Number
4.5 mm Locking /Non-Locking	2100-3100 (3.1 mm)	2100-0007	2100-0016
5.5 mm Locking /Non-Locking	2100-4100 (4.1 mm)	2100-0008	2100-0017

Table 1
Screw/Drill/Guide Reference

SCREW FIXATION

Threaded Plate Holes

Locking screws and non-locking screws can be used in any of the threaded plate holes. It is the surgeon's preference whether locking or non-locking fixation should be used. When using locking or non-locking screws on axis, thread the appropriate-sized drill guide into the plate and drill with appropriate drill bit to the desired depth *(Table 1)*.

Screw length can be determined by reading the drill bit etch at the top of the drill guide *(Figure 1)*. As an alternative, the Large Depth Indicator can be used in a traditional manner.

When using locking or non-locking screws off-axis, thread the appropriately-sized cone drill guide into the plate and drill with the appropriate drill bit to the desired depth *(Table 1)*. The **Cone Drill Guide** limits off-axis to 12.5 degrees which helps limit screw head prominence. Screw length should be measured using the traditional method with the Large Depth Indicator.

Note: *Do not use the Cone Drill Guide and drill bit etches to determine screw length. This could result in a short screw and should be avoided.*

Figure 2
Plate Compression Holes

Non-Threaded Compression Holes

To achieve compression through the compression slots, use the appropriate diameter non-locking screw. Ensure fixation of the plate on the distal side of the fusion site. Place the appropriate non-locking drill guide into the most proximal point of the compression hole, drill with the appropriate drill bit to the desired depth *(Table 1)*. Screw length should be assessed using traditional method with the Large Depth Indicator. Drive the screw until it fully seats into the distal portion of the compression hole. Compression is achieved as the screw travels to the distal portion of the hole *(Figure 2)*.

Compression Using Fully Threaded Screws and Overdrills

To achieve compression using fully threaded screws, choose the appropriate diameter non-locking screw. Place the appropriate non-locking drill guide in the appropriate position, drill with appropriate drill bit to the desired depth *(Table 1)*. Screw length should be measured using the traditional method with the Large Depth Indicator. Then use the appropriate diameter non-locking drill guide with the appropriate overdrill bit *(Table 1)* to the desired depth; the desired depth to achieve compression should be to fusion/fracture site. Drive the screw until it fully seats.

CATALOG NO.	PART DESCRIPTION	
Plates for Tibiotalar Procedures		
2000-8001	ANTERIOR TENSION BAND PLATE	
2000-8002	STRAIGHT ANTERIOR PLATE	
2000-8003	RIGHT ANTERIOR PLATE - STANDARD	
2000-8004	RIGHT ANTERIOR PLATE - LONG	
2000-8005	LEFT ANTERIOR PLATE - STANDARD	
2000-8006	LEFT ANTERIOR PLATE - LONG	
2000-8007	LATERAL TT PLATE - STANDARD	
2000-8008	LATERAL TT PLATE - LONG	
2000-8009	LATERAL TTC PLATE - STD	

IMPLANT LISTING

CATALOG NO.	PART DESCRIPTION
Plates for Tibiotalocalcaneal Procedures	
2000-8010	LATERAL TTC PLATE - LONG
2000-8011	POSTERIOR TT
2000-8012	POSTERIOR TTC

CATALOG NO.	DIAMETER	LENGTH
Locking Screws for Procedures		
2000-4516 to 2000-4550	4.5mm	16 - 50mm
2000-5526 to 2000-5560	5.5mm	26 - 60mm
Non-Locking Screws for Procedures		
2001-4516 to 2001-4550	4.5mm	16 - 50mm
2001-5526 to 2001-5560	5.5mm	26 - 60mm

Ordering Information: *Please order EPIC Extremity Fusion Kit- EP_FUSN for all fusion procedures outlined in this technique. Order KIT-EP_70 or Kit-EP_65HL for crossing screws outlined in this technique, and order k-wires (341-35-00) for temporary fixation wires outlined in this technique.*

CATALOG NO.	PART DESCRIPTION
2100-0003	Depth Gauge
2100-0021	Cone Guide Inserter
2100-3100 2100-4100	3.1mm Solid Drill Bit 4.1mm Solid Drill Bit
2100-0007 2100-0008	4.5mm Screw Locking Drill Guide 5.5mm Screw Locking Drill Guide
2100-0016 2100-0017	4.5mm Screw Cone Drill Guide 5.5mm Screw Cone Drill Guide
2100-0020	Solid Screwdriver, Size T20
2100-0200	2.0 Threaded Olive Pin
2100-3141	3.1/4.1 Double-Ended Drill Guide
1FS11-C09	Medium Fixed AO Handle
1RS11-C09	Medium Ratchet AO Handle

Ordering Information: *Please order EPIC Extremity Fusion Kit- EP_FUSN for all fusion procedures outlined in this technique. Order KIT-EP_70 or Kit-EP_65HL for crossing screws outlined in this technique, and order k-wires (341-35-00) for temporary fixation wires outlined in this technique.*

Exactech is proud to have offices and distributors around the globe. For more information about Exactech products available in your country, please visit www.exac.com

---

For additional device information, refer to the EPIC Extremity–Instructions for Use for a device description, indications, contraindications, precautions and warnings. For further product information, please contact Customer Service, Exactech, Inc., 2320 NW 66th Court, Gainesville, Florida 32653-1630, USA. (352) 377-1140, (800) 392-2832 or FAX (352) 378-2617.

Exactech, as the manufacturer of this device, does not practice medicine, and is not responsible for recommending the appropriate surgical technique for use on a particular patient. These guidelines are intended to be solely informational and each surgeon must evaluate the appropriateness of these guidelines based on his or her personal medical training and experience. Prior to use of this system, the surgeon should refer to the product package insert for comprehensive warnings, precautions, indications for use, contraindications and adverse effects.

EXACTECH, INC.
2320 NW 66TH COURT
GAINESVILLE, FL 32653 USA

+1 352.377.1140
+1 800.EXACTECH
+1 352.378.2617 (FAX)
www.exac.com