VILEX

TRIAD

Transverse Tibial Bone Transport

Surgical Technique

TRIAD

Proper surgical procedures and techniques are the responsibility of the medical professional. The following guidelines are furnished for information purposes only. Each surgeon must evaluate the appropriateness of the procedures based on his or her personal medical training and experience. Prior to use of the system, the surgeon should refer to the product package insert for complete warnings, precautions, indications, contraindications and adverse effects. Package inserts are also available by contacting VILEX, LLC.

For information on product availability in your area, please contact your local sales representative.

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DYNEX® TRIAD SURGICAL TECHNIQUE

DYNEX® TRIAD Surgical Technique

INTRODUCTION

Dedicated Fixation for Transverse Tibial Transport

DYNEX® TRIAD is a dedicated external fixation system for Tibial Cortex Transverse Transport (TTT). Based on published literature, TTT is a limb-preservation procedure that can promote wound healing in recalcitrant diabetic foot ulcers (DFU) and ischemic lower extremity wounds through induction of angiogenesis. Published outcomes from TTT procedures in recalcitrant diabetic foot ulcers report **wound healing rates of 92–96% at one-year follow-up**, with **amputation rates of 1.9–4.9%** — compared to a lifetime amputation rate of 15–20% in conventionally managed DFU.[1,2,3]

The DYNEX® TRIAD - TTT Fixation System includes a fixation frame, transport pins, fixation pins, and instruments necessary for the attachment of the pins and frame to the patient. The frame is fixated to the tibia to facilitate transverse tibial bone transport. The DYNEX® TRIAD - TTT Fixation System is intended for use with the DYNEX® External Fixation System and is compatible with the DYNEX® half pins, rings, and accessories.

DYNEX® Comprehensive Limb Salvage Solutions

The DYNEX® External Fixation System is a comprehensive solution designed to address the unique demands of advanced limb salvage, deformity correction, and long bone reconstruction.

The DYNEX® External Fixation System delivers versatility within one connected platform. Ring options span 130mm to 230mm across full, half, 5/8, and arched toe rings, and DYNEX is the only adult external fixation system to offer both Hydroxyapatite (HA) coated wires and half pins to help reduce loosening and pin site infection. DYNEX® also offers:

- Hexapod struts paired with Six-Axis CORREX Deformity Correction Software
- Speed Struts lock in compression or distraction quickly
- Specialty components such as: hinges, z-plates, linear distractors and a foot plate shoe with spring-walk mechanics for wound offloading

For full instructions for use of the DYNEX® External Fixation System please reference DYNEX® Surgical Technique (Document # QSD 8.13-19).

[1]. Chen Y, et al. Effect of tibial cortex transverse transport in patients with recalcitrant diabetic foot ulcers: a prospective multicenter cohort study. J Orthop Translat. 2022;36:194-204.
[2]. Yuan Y, et al. Tibial cortex transverse transport accelerates wound healing via enhanced angiogenesis and immunomodulation. Bone Joint Res. 2022;11(4):189-199.
[3]. Efficacy of tibial cortex transverse transport in treating diabetic foot ulcer. Diabetol Metab Syndr. 2024;16:160.

Transport Pin Options

TRIAD Transport Pins		
Diameter	Length	Part Number
Ø 3.5mm	80mm	DXT-35-80
Ø 3.5mm	130mm	DXT-35-130

Half Pin Options

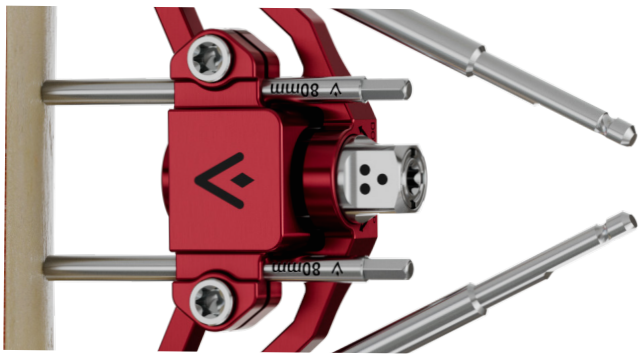
Half Pin Options*		
Diameter	Length	Part Number
Ø 4.5mm	150mm x 25mm	DS-HP45-150-25N
Ø 4.5mm	150mm x 30mm	DS-HP45-150-30N
Ø 4.5mm	150mm x 35mm	DS-HP45-150-35N
Ø 4.5mm	150mm x 40mm	DS-HP45-150-40N
Ø 4.5mm	150mm x 45mm	DS-HP45-150-45N
Ø 4.5mm	150mm x 50mm	DS-HP45-150-50N
Ø 4.5mm	150mm x 55mm	DS-HP45-150-55N
Ø 6mm	150mm x 25mm	DS-HP60-150-25N
Ø 6mm	150mm x 30mm	DS-HP60-150-30N
Ø 6mm	150mm x 35mm	DS-HP60-150-35N
Ø 6mm	150mm x 40mm	DS-HP60-150-40N
Ø 6mm	150mm x 45mm	DS-HP60-150-45N
Ø 6mm	150mm x 50mm	DS-HP60-150-50N
Ø 6mm	150mm x 55mm	DS-HP60-150-55N

* Sterile Packaged HA Coated Half Pins Available

DYNEX® TRIAD Surgical Technique

TRIAD FEATURES

DYNEX® TRIAD TTT Fixator Features



The DYNEX® TRIAD TTT Fixation System is purpose-built for transverse tibial bone transport, providing external fixation for a range of defects, deformities, non-unions, and pseudoarthrosis of long bones. Designed for minimally invasive bone transport, TRIAD pairs a pre-assembled fixator with an MIS Corticotomy Guide to deliver fast, reproducible results while preserving the soft tissue envelope.

The system can serve as a standalone device or integrate directly with the DYNEX® External Fixation System for added construct stability during transport. One platform, fully extensible. Below, the features that make TRIAD a versatile solution for complex limb reconstruction:

Bone Transport, Simplified.

- Pre-assembled fixator designed for quick fixation.
- MIS Corticotomy Guide for fast, reproducible results and minimally soft tissue envelope disruption.

Versatile Fixation Options

- Designed for use with 4.5mm or 6.0mm half pins options accommodate a variety of patient anatomies.
    - 25mm-55mm Thread Lengths
- Transport pins offered in 80mm and 130mm Lengths.

Precise and Controlled Distraction

- Adjustment Knob delivers 0.25mm per quarter turn (1.0mm per full revolution)
    - Clockwise for distraction, counter-clockwise for compression
- Total running distance of 10mm

DYNEX® TRIAD Surgical Technique

INDICATIONS & CONTRAINDICATIONS

Indications

The DYNEX® External Fixation Systems are intended for external fixation with the following indications:

- Stabilization of Fractures & Osteotomy
- Rear and Mid-foot Arthrodesis
- Adult and Pediatric Leg Lengthening
- Correction of Bony or Soft Tissue Defects or Deformities in Upper & Lower Extremities
- Pseudoarthrosis or Non-union of Long Bones

The DYNEX® TRIAD - TTT Fixation System is intended for external fixation in the treatment of non-union or pseudoarthrosis of long bones and correction of bony or soft tissue defects or deformities via tibial bone transport.

Contraindications

Do not use Vilex implants in the presence of any contraindication.

Contraindications include, but are not limited to:

- Reconstruction of Neck, Head, Spine, or Back
- Articulating Joint: Shoulder, Elbow, Wrist, Hip, Knee
- Presence of active or overt infection and/or localized inflammation
- Use in displaced, non-reduced fractures with bone loss
- Rapid joint disease, bone absorption, osteopenia, and/or osteoporosis
- Patients with mental or neurologic conditions who are unwilling or incapable of following postoperative care instructions
- Suspected or documented metal allergy or intolerance
- Any patient having inadequate tissue coverage over the operative site
- Any time implant utilization would interfere with anatomical structures or expedited physiological performance, such as impinging on vital structures
- Severe comminuted fractures such that segments may not be maintained in satisfactory proximate reduction
- Insufficient quantity or quality of bone including blood supply limitations.

MRI Statement

The DYNEX® External Fixation System has not been evaluated for safety and compatibility in the MR environment. It has not been tested for heating, migration, or image artifact in the MR environment. The safety of the DYNEX® External Fixation System in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.

DYNEX® TRIAD Surgical Technique

FLAP OPERATIVE GUIDE

General Overview

The Surgical Technique steps listed below are designed to provide a general overview on the instruments and procedure for implanting DYNEX® TRIAD with a flap approach. Optionally, the surgeon may opt for a completely open approach instead of a flap. An MIS approach can also be achieved through the following steps, with stab incisions as an alternative to a flap.

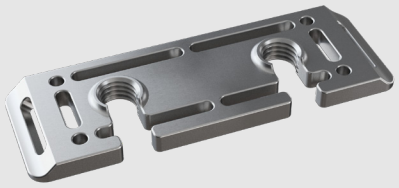
1. Planning & Patient Positioning

Preoperative planning is left to the discretion of the surgeon.

For optimal fixation and transport alignment, it is recommended the transport mechanism be positioned along the anteromedial surface of the proximal tibial diaphysis, centered over the flat portion of the tibial cortex.

NOTE: If integration with a DYNEX Ring External Fixator is intended, ensure ring(s) are positioned on the patient superior to the corticotomy site because ring assembly with implanted wires or pins may not be possible.

INSTRUMENTS USED



CUTTING GUIDE

DXT-TTT-02

2. Corticotomy Planning & Flap Creation

Place the Cutting Guide (DXT-TTT-02) on the skin, ensuring the guide is oriented with slots directed anteriorly. Confirm proper alignment with the planned corticotomy site using fluoroscopy, as necessary. **FIGURE 1**

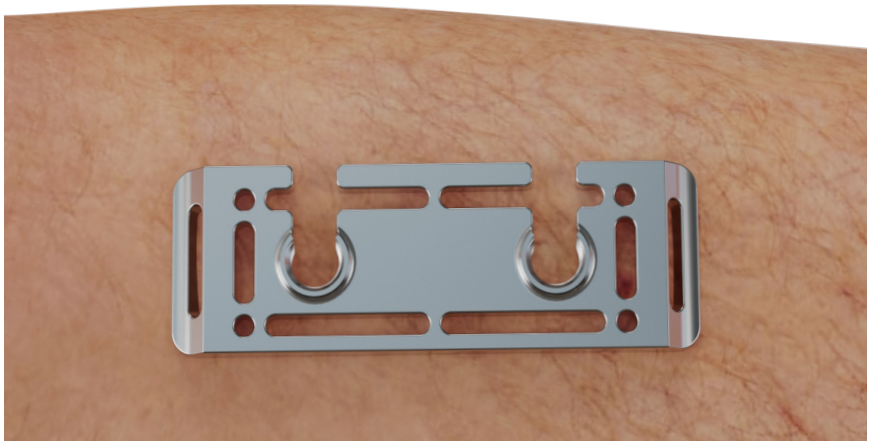


FIGURE 1

NOTE: Ensure the planned bone segment is centered over the medullary canal, as this is necessary for a successful transport segment.

NOTE: Ensure the location is at least 40mm distal to the tibial plateau to allow placement of bicortical fixation screws without risk to the articular surface.

Using the Cutting Guide as reference, mark the skin for the following landmarks . **FIGURE 2**

1. The locations of two Transport Pin incisions
2. The perimeter of the Cutting Guide
3. An approximately 100mm arched incision for surgical access to the corticotomy site

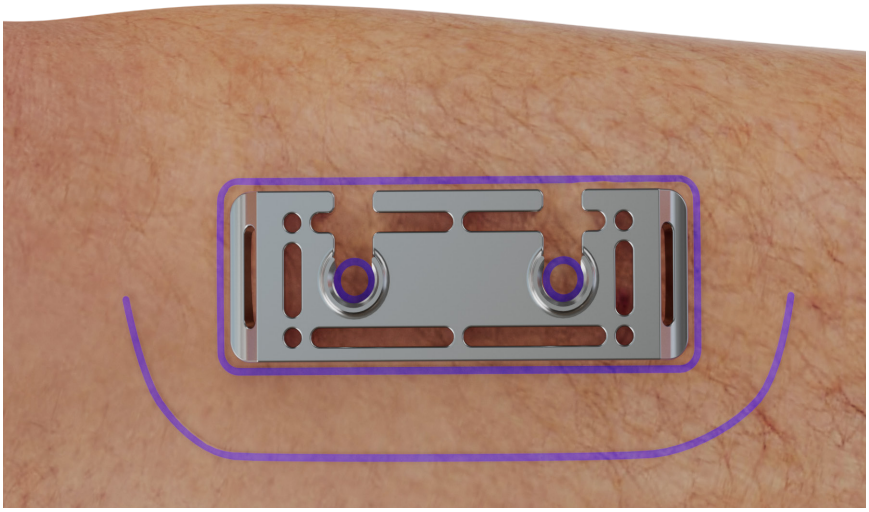


FIGURE 2

Remove the Cutting Guide. Make two 8-10mm longitudinal skin incisions at the marked locations for the Transport Pins. **FIGURE 3**

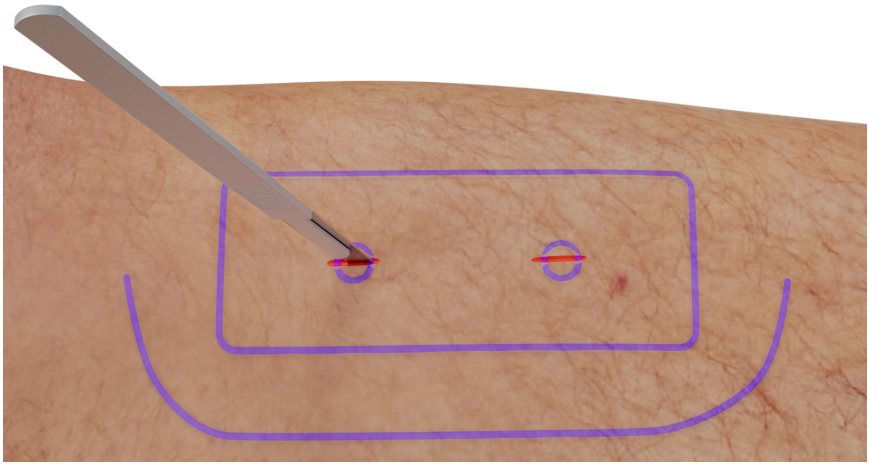
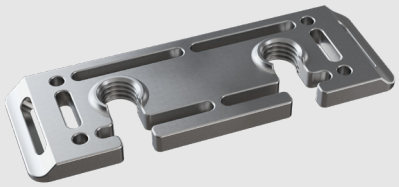


FIGURE 3

INSTRUMENTS USED



CUTTING GUIDE

DXT-TTT-02

Thread two Cutting Guide Inserts (DXT-TTT-19) into the Cutting Guide. Insert one Cutting Guide Pin Bushing (DXT-TTT-20) into each Cutting Guide Inserts. **FIGURE 4**

FIGURE 4

Position the Cutting Guide by aligning it with the previously marked skin outline. Insert two Ø2x150mm Pins (K150-20S) bicortically through the Cutting Guide Pin Bushings and the transport pin incisions.

Cut both Ø2x150mm Pins approximately 5mm above the Cutting Guide Pin Bushings. Remove the Cutting Guide by lifting it off the two cut pins. **FIGURE 5**

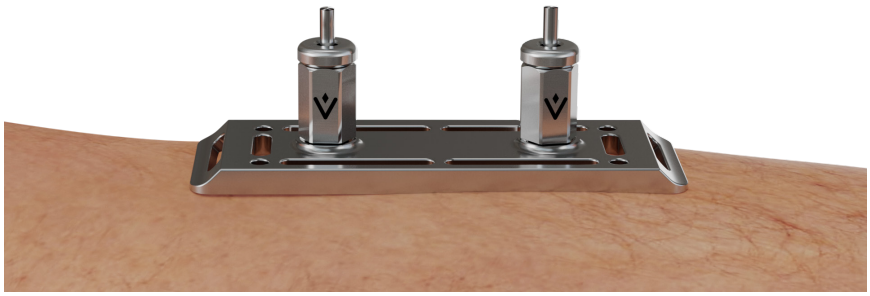


FIGURE 5

Create the previously marked incision for access to the corticotomy site.

Carefully open the incision, elevating the soft tissue to expose the two cut pins. Ensure the incision provides adequate visualization and working space to allow repositioning of the Cutting Guide and performance of the partial corticotomy. **FIGURE 6**

INSTRUMENTS USED

CUTTING GUIDE INSERTS

DXT-TTT-19

CUTTING GUIDE PIN BUSHING

DXT-TTT-20

2 X 150MM PINS

K150-20S

INSTRUMENTS USED

2 X 150MM PINS

K150-20S

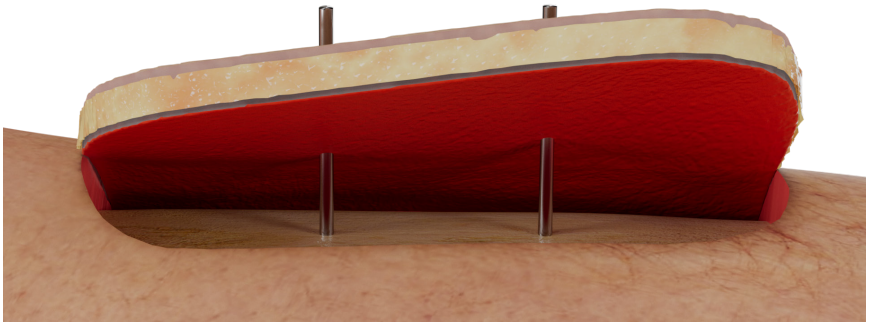


FIGURE 6

Replace the Cutting Guide with Guide inserts and Pin Bushings over the wires to align the Cutting Guide with the planned corticotomy location. **FIGURE 7**

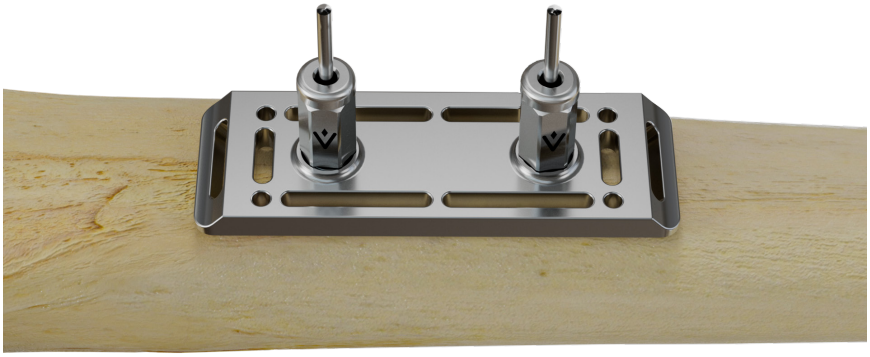


FIGURE 7

With the Cutting Guide in place, place at least one, and preferably two, additional Pins through the anterior corners of the Cutting Guide, as shown, to prevent movement during cutting. **FIGURE 8**

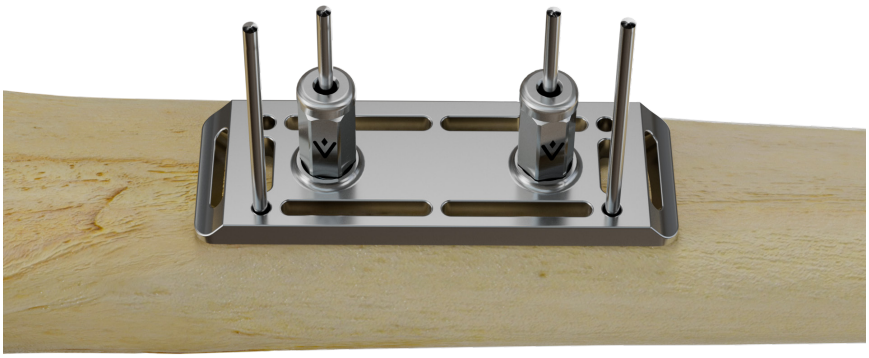


FIGURE 8

3. Partial Corticotomy

With at least three K-wires in place, create a partial corticotomy using the 2.2mm Burr (DI222075R) by cutting through the cutouts of the Cutting Guide. Alternatively, the 2.5mm Drill (DXT-TTT-05) can also be used to make these cuts through the Cut Guide.

The cutouts define discrete cuts along the perimeter of the planned **15 × 50 mm Bone Window and should remain unconnected at this stage.** At the surgeon's discretion, the short cuts can be made using angled or flat cutouts. **FIGURE 9**

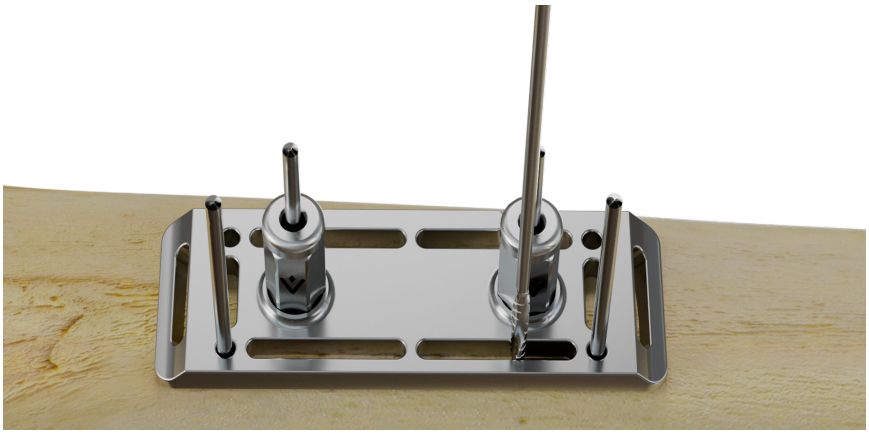


FIGURE 9

NOTE: At the surgeon's discretion, cuts may be performed along three sides of the window (both short sides and the posterior side), with the anterior cut completed after pin placement.

WARNING: Do not completely free the bone segment at this stage.

WARNING: Do not remove cutting guide at this stage.

Replace the skin flap by pulling it over the cutting guide and aligning the flap incisions with the Cutting Guide Inserts and Cutting Guide Pin Bushings. Do not remove the Cutting Guide, Cutting Guide Inserts, Cutting Guide Pin Bushings, or anterior K-Wires. **FIGURE 10**

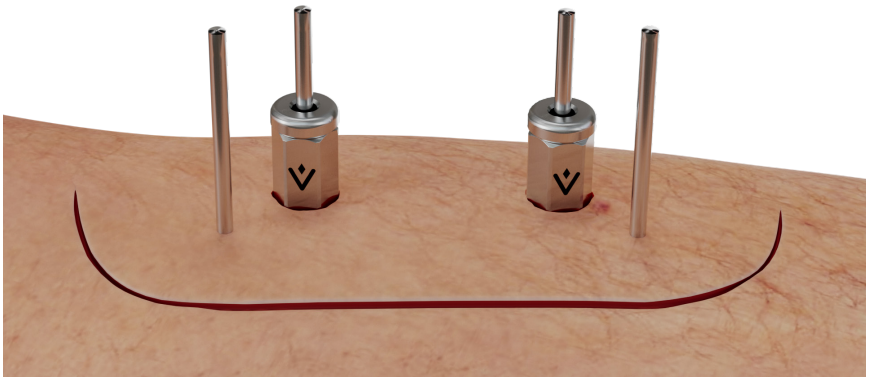


FIGURE 10

INSTRUMENTS USED

2.2MM BURR

DI222075R

2.5MM DRILL

DXT-TTT-05

With the skin flap closed, remove one K-wire and corresponding Pin Bushing while leaving the Cutting Guide Insert in place.

Insert the Ø2.5 mm Drill Guide (DXT-TTT-03) and corresponding Ø2.5 mm Trocar (DXT-TTT-16) into the Cutting Guide until they contact the bone surface. **FIGURE 11**

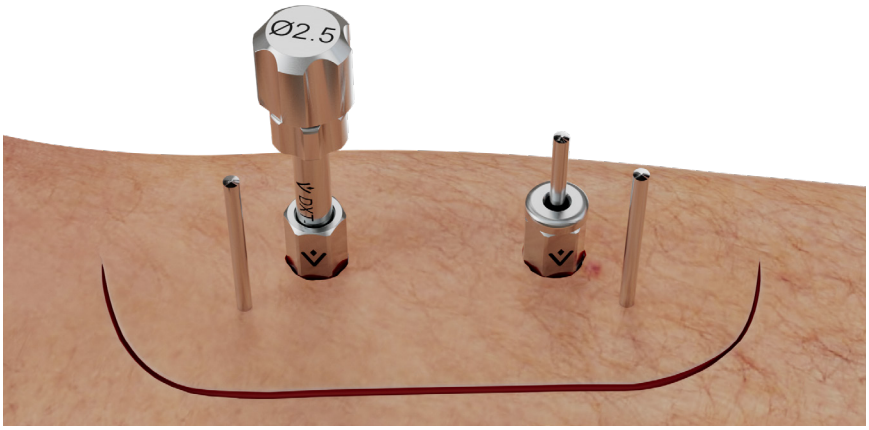


FIGURE 11

Remove the Trocar and drill a pilot hole through the Ø2.5 mm Drill Guide using the Ø2.5 mm Drill (DXT-TTT-05) to the desired depth or until the drill stop contacts the Drill Guide (10mm drill depth). **FIGURE 12**

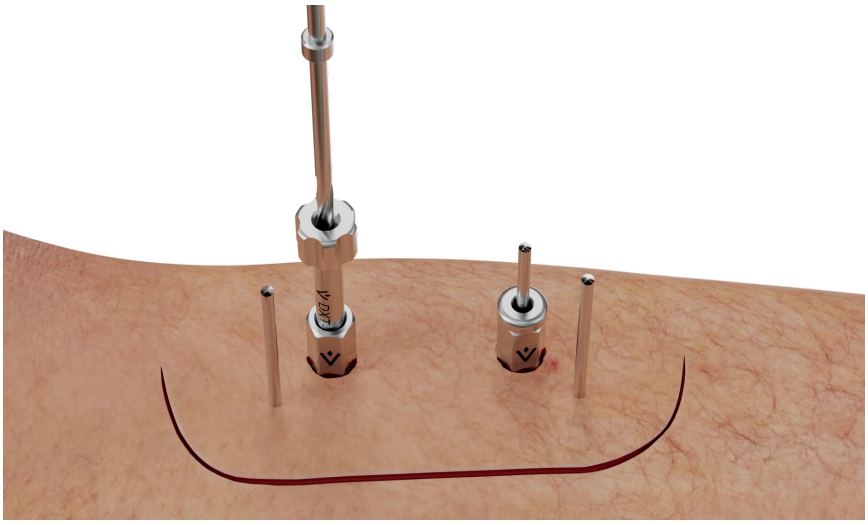


FIGURE 12

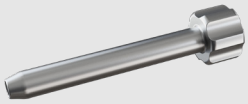
Remove the Drill Guide.

Using the Pin Driver (DXT-TTT-07) insert the desired Transport Pin (DXT-35-80 or DXT-35-130) through the Cutting Guide until the shoulder stop seats against the bone, corresponding to 10mm of insertion.

Seating may be confirmed by tactile feedback or visually by temporarily removing the Cutting Guide. **FIGURE 13**

WARNING: Do not over-insert the Transport Pin. Excessive insertion may result in bone stripping.

INSTRUMENTS USED



2.5MM DRILL GUIDE

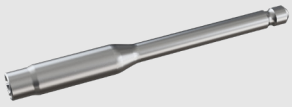
DXT-TTT-03

2.5MM TROCAR

DXT-TTT-16

2.5MM DRILL

DXT-TTT-05



PIN DRIVER

DXT-TTT-07

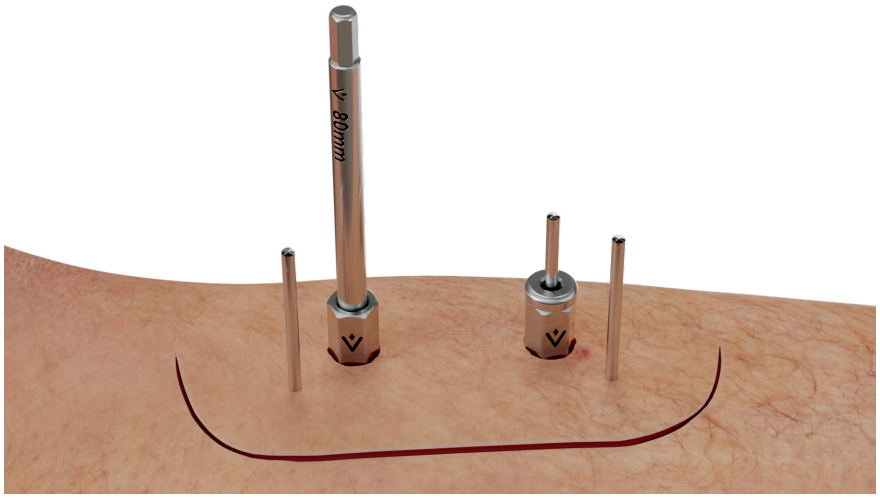


FIGURE 13

Remove the second K-wire and corresponding Pin Bushing and repeat the proceeding steps to place the second transport pin. **FIGURE 14**

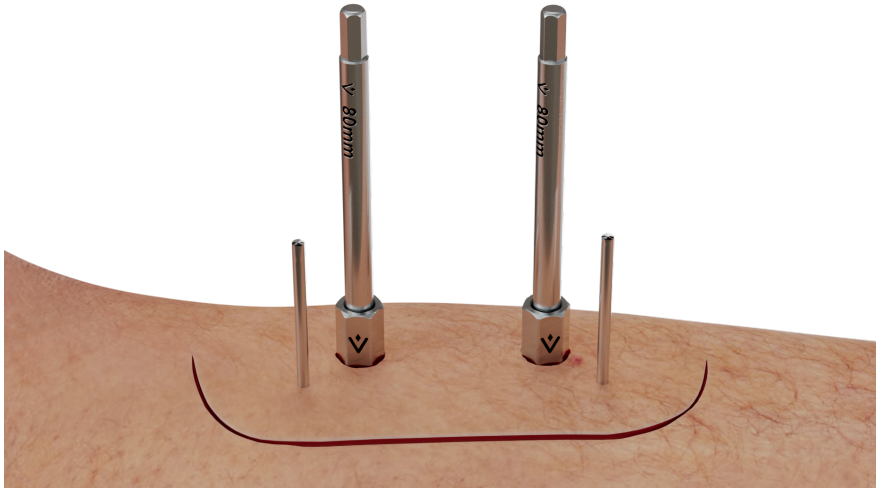


FIGURE 14

Remove the anterior K-wires and and unthread the Cutting Guide Inserts using the 7mm Wrench (DXT-TTT-23). Slide the Cutting Guide off the Transport Pins. The Cutting Guide is slotted and can easily slide off while Transport Pins are in place. **FIGURE 15**

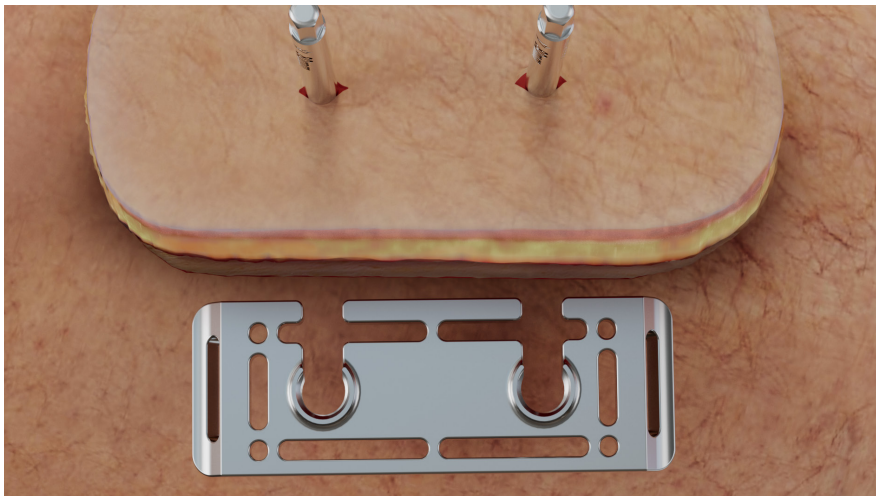
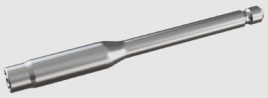


FIGURE 15

INSTRUMENTS USED

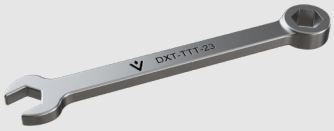


PIN DRIVER

DXT-TTT-07

TRANSPORT PIN

DXT-35-XXX



7MM WRENCH

DXT-TTT-23

Confirm Transport Pin placement using fluoroscopy. Transport Pins should be inserted monocortically, engaging only the near cortex. **FIGURE 16**

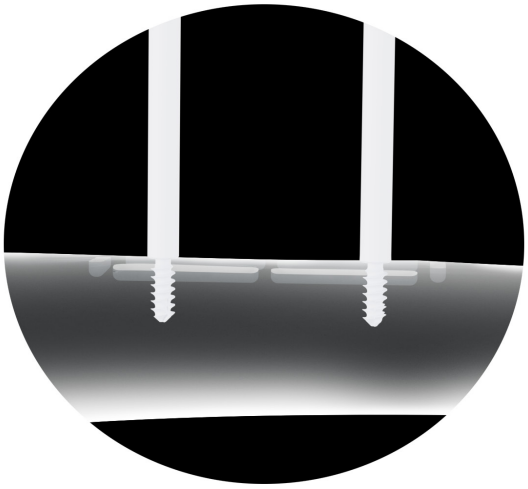


FIGURE 16

4. Fixation Frame Application

Set the Fixation Frame (DXT-TTT-01) to the “Zero” position using the Progress Scale and Indicator Dots.

The Progress Scale has markings at 1 mm intervals, while the device can move in 0.25 mm increments.

When the Progress Scale mark aligns exactly with a whole millimeter value (e.g., 0, 1, 2 mm) and the Indicator Dots read “1,” the device is at that exact position. **FIGURE 17**

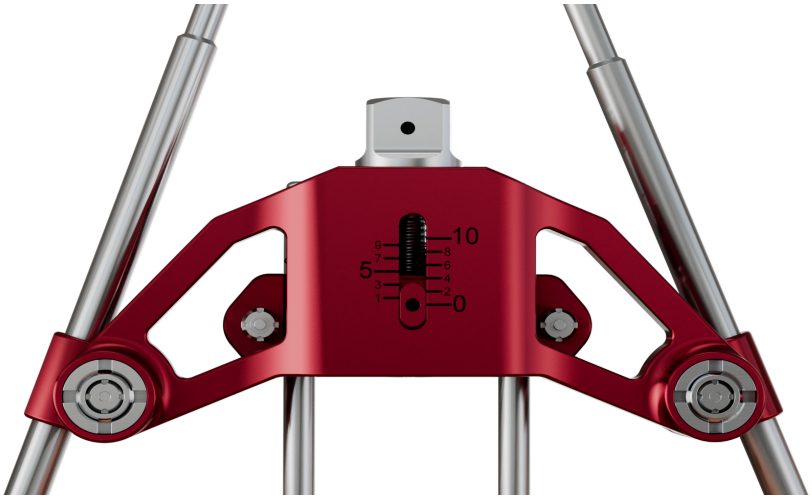


FIGURE 17

NOTE: Always read the Indicator Dots from the same side as the Progress Scale to ensure accuracy.

INSTRUMENTS USED

FIXATION FRAME

DXT-TTT-01

Attach the Fixation Frame to the Transport Pins by aligning the holes in the transport arm with the pins, then carefully slide the frame over them until seated at the desired position.

When positioning the frame, consider patient anatomy, soft tissue thickness, and the planned distraction distance, taking care not to stress the partially released bone segment. **FIGURE 18**

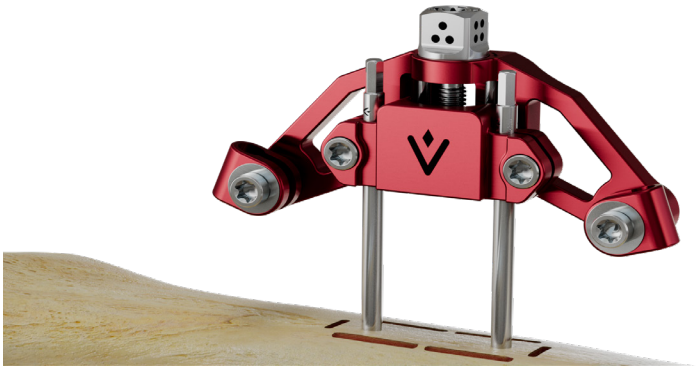


FIGURE 18

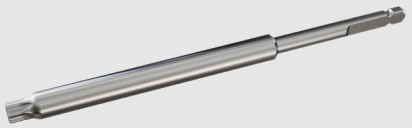
Stabilize the Transport Pins to prevent torque transmission to the bone segment during clamp tightening. If desired, the Pin Driver can be attached to a Transport Pin and used as a counter-torque by holding the driver handle during final tightening. This method may help prevent excessive torque from transferring to the bone segment. Care should be taken to avoid bending forces on the pins or bone segment.

Secure each Transport Clamp Screw using the T30 Driver (DXT-TTT-13), tightening one clamp at a time until fully seated. **FIGURE 19**

FIGURE 19

CAUTION: Avoid excessive force to prevent damage to the bone segment or loss of pin fixation

INSTRUMENTS USED



T30 DRIVER

DXT-TTT-13

5. Standalone Fixation Frame

NOTE: For integration with a DYNEX Circular External Fixator, see Section 6 **[PAGE 18]**

The Fixation Frame is compatible with the Ø4.5 mm and Ø6.0 mm DYNEX Half Pins for use as fixation pins.

Select the Drill Guide, Drill Bit, and Trocar corresponding to the intended pilot hole size (Ø3.2 mm for Ø4.5 mm Half Pins; Ø4.5 mm for Ø6.0 mm Half Pins).

Pin Size	Drill Size	Drill Guide Size	Trocar Size
4.5 mm	3.2 mm	3.2 mm	3.2 mm
6.0 mm	4.5 mm	4.5 mm	4.5 mm

Insert the Drill Guide (DXT-TTT-XX) at the desired trajectory into the fixation clamp until it bottoms out on the bone surface.

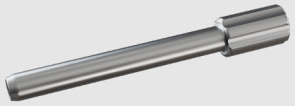
The clamp allows positioning in 7° increments to select the appropriate trajectory based on anatomy and planned fixation. If needed, use the matching trocar through the guide to create a soft tissue entry point. **FIGURE 20**

FIGURE 20

NOTE: The fixation clamp angle is limited to help avoid pin-to-pin interference.

Lock the Drill Guide in place by tightening the fixation clamp screw with the T30 Driver. **FIGURE 21**

INSTRUMENTS USED



DRILL GUIDE

DXT-TTT-XX

DRILL BIT

DXT-TTT-XX

TROCAR

DXT-TTT-XX

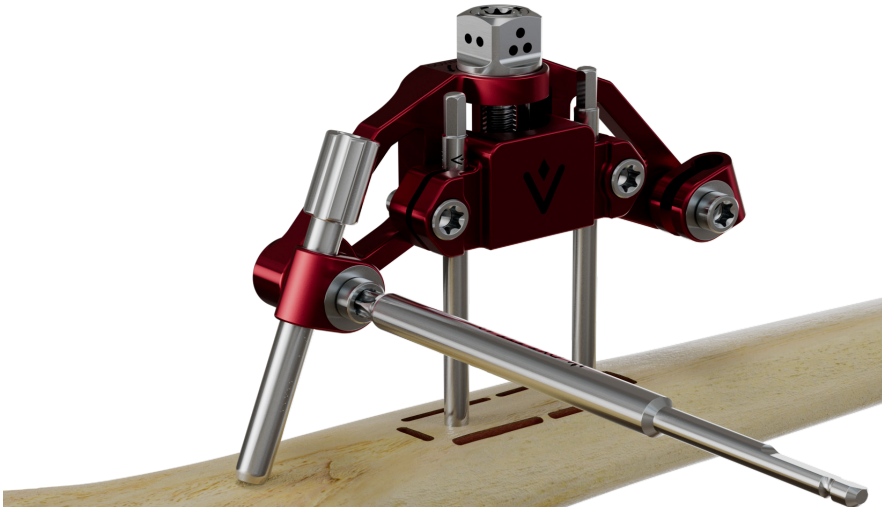


FIGURE 21

Drill to the desired depth through the guide using the Drill Bit (DXT-TTT-XX) that corresponds to the selected guide and desired Half Pin size (Ø4.5 mm or Ø6.0 mm). **FIGURE 22**

The linear scale on the Drill Bit can be used to aid in pin length selection. Thread lengths are available in 5 mm increments from 10 mm to 60 mm.

FIGURE 22

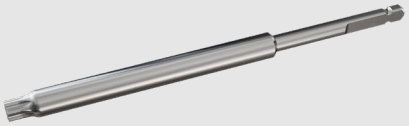
Loosen the clamp with the T30 Driver just enough to remove the Drill Guide. Take care not to over-loosen or move the clamps out of position, as this can alter the set trajectory. Do not loosen enough to disengage the locking teeth.

Repeat the previous steps to drill for the second Half Pin on the opposite side of the Fixation Frame.

INSTRUMENTS USED

DRILL BIT

DXT-TTT-XX



T30 DRIVER

DXT-TTT-13

Insert each Half Pin (DS-HP45-150-XXN or DS-HP60-150-XXN) or HA Coated Half Pin (DS-HP45-XXX-XXB or DS-HP60-XXX-XXB) using the Ratcheting AO Handle (H254) to the desired depth, ensuring bicortical fixation is achieved.

Depth may be confirmed visually or by tactile feedback as the pin advances through the far cortex. **FIGURE 23**

FIGURE 23

Stabilize the Fixation Pins to prevent torque transmission during clamp tightening. If desired, the AO Handle can be attached to a Half Pin and used as a counter-torque by holding the driver handle during final tightening.

Secure each Fixation Clamp Screw using the T30 Driver, tightening one clamp at a time until fully seated. **FIGURE 24**

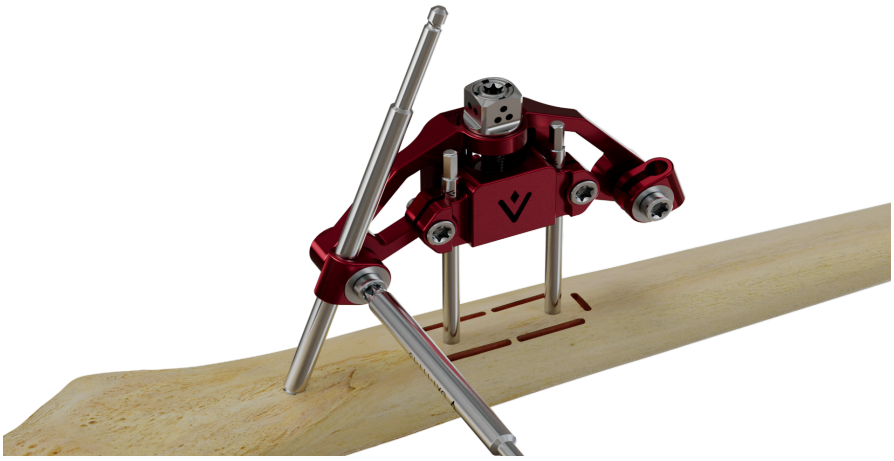


FIGURE 24

NOTE: Avoid excessive force to prevent loss of Half Pin fixation.

Pins can be trimmed to the desired length. Ensure sufficient length is left to engage the power equipment for removal.

[Proceed to Section 7: Free Transverse Bone Segment]

INSTRUMENTS USED

4.5MM HALF PIN

DS-HP45-XXX-XXN

6.0MM HALF PIN

DS-HP60-XXX-XXN

4.5MM HALF PIN, HA COATED

DS-HP45-XXX-XXB

6.0MM HALF PIN, HA COATED,

DS-HP60-XXX-XXB

RATCHETING AO HANDLE

H254

6. Integration with Dynex Circular External Fixation

NOTE: If the Freestanding Application method was used, continue direction to Section 7 [PAGE 19]

Assemble the DYNEX Ring External Fixator according to the DYNEX Surgical Technique and the surgical plan.

Configure the TRIAD Fixation Frame assembly attaching two Ring Adaptors (DXT-TTT-21 or DXT-TTT-22) through the Fixation Clamps. Lock the Ring Adaptor in place by tightening the fixation clamp screw with the T30 Driver.

The Ring Adaptors are available in long and short lengths to accommodate different patient sizes. **FIGURE 25**

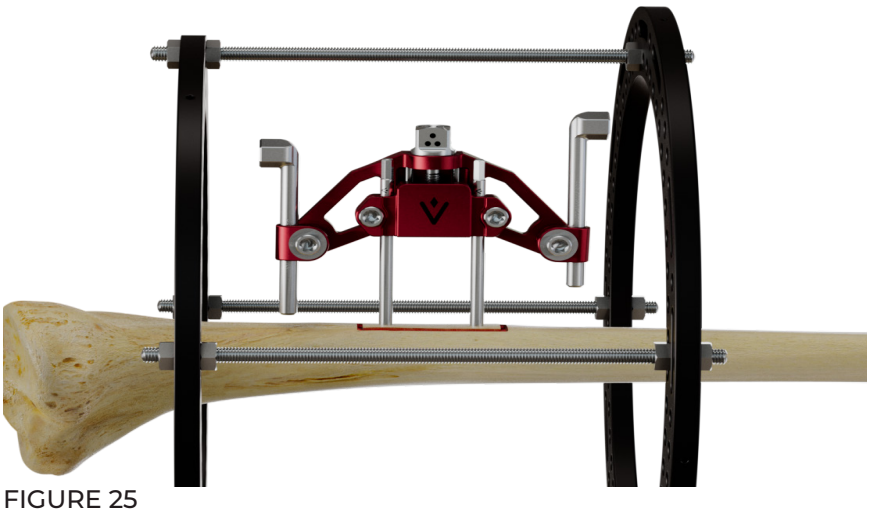


FIGURE 25

NOTE: The clamp allows positioning in 7° increments to select the appropriate trajectory planned DYNEX frame placement.

Insert Threaded Rods (DSF-450-06-XXX) into the Ring Adaptors and attached the assembly to the DYNEX frame with 10mm Nuts (DSF-610-10). **FIGURE 26**

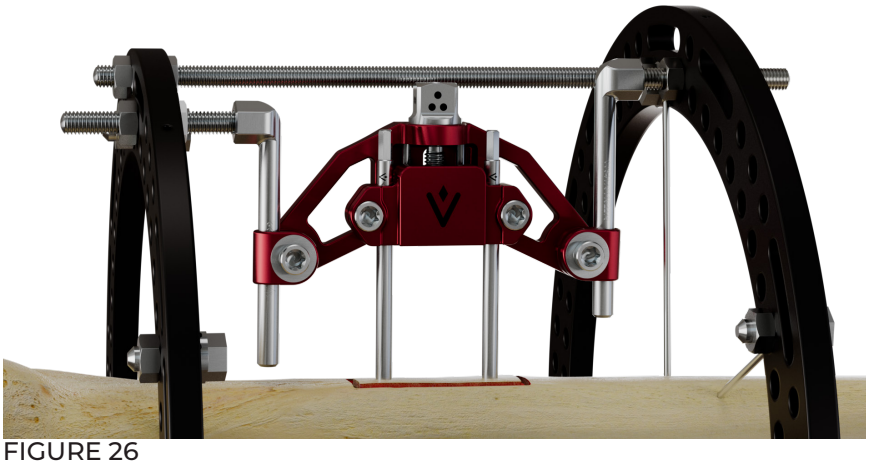
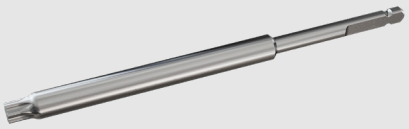


FIGURE 26

INSTRUMENTS USED



T30 DRIVER

DXT-TTT-13

RING ADAPTOR

DXT-TTT-2X

THREADED RODS *

DSF-450-06-XXX

** AVAILABLE IN DYNEX EXTERNAL FIXATION ASSEMBLY TRAY*

10MM NUT *

DSF-610-10

** AVAILABLE IN DYNEX EXTERNAL FIXATION APPLICATION TRAY*

WARNING: Dynex Triad fixation clamps require use of Ring Adaptors and shall not be directly clamped onto the threaded rods. Avoid excessive force to prevent loss of fixation.

Secure each DYNEX Ring External Fixator 10mm Nut, or Bolt if appropriate, utilizing the 10mm Wrench (DF-915-CW-10).

Ensure the DYNEX Ring Construct is adequately fixated to bone via half pins or wires following the existing DYNEX Surgical Technique and the surgical plan.

7. Free Transverse Bone Segment

Complete the corticotomy freehand, as the Cutting Guide will no longer be attached. Remove any remaining bone connections between the segment and the surrounding cortex.

Use the Ø2.2 mm Burr to advance carefully along the remaining cortical bridge. **FIGURE 27**

Alternatively, use the 6.0 mm Osteotome (DXT-TTT-08) to connect pre-drilled burr holes and release the segment.

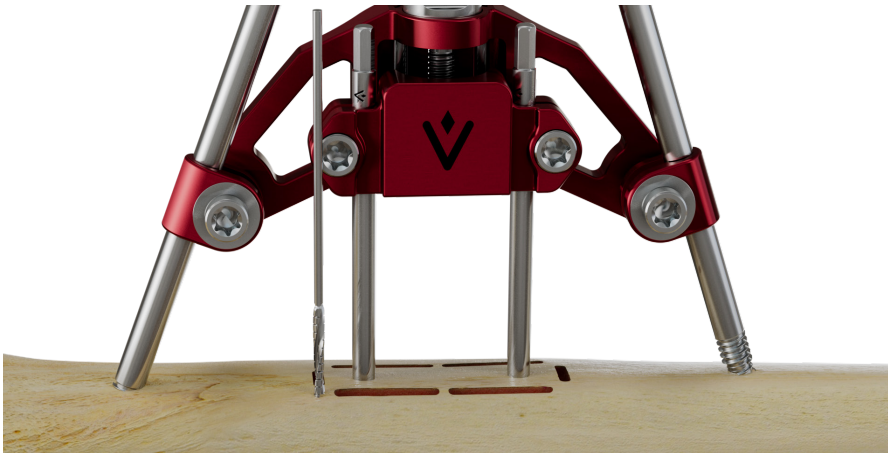


FIGURE 27

Confirm the bone segment is fully released by visual inspection and gentle mobilization. **FIGURE 28**

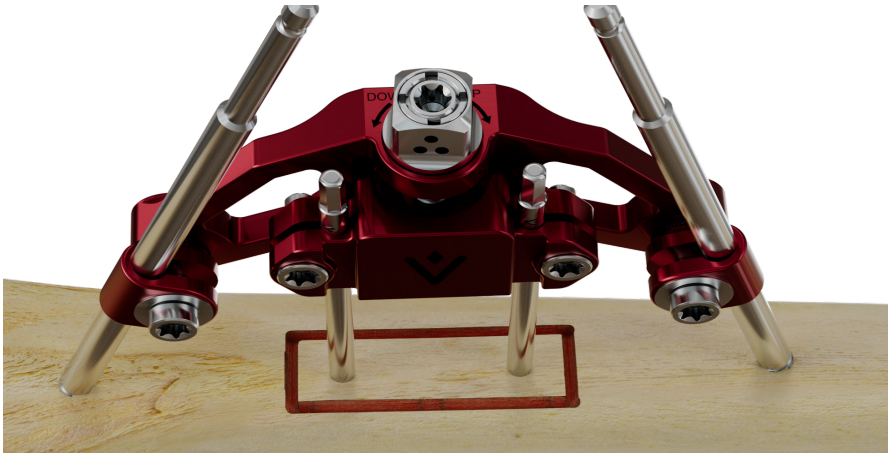
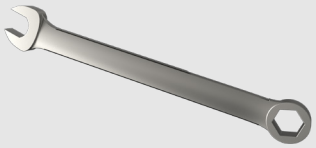


FIGURE 28

INSTRUMENTS USED



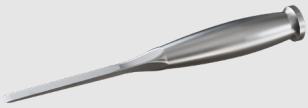
10MM WRENCH *

DF-915-CW-10

** AVAILABLE IN DYNEX EXTERNAL FIXATION APPLICATION TRAY*

2.2MM BURR

DI222075R



6MM OSTEOTOME

DXT-TTT-08

WARNING: Perform all cutting and osteotome work slowly and deliberately to avoid unintended fractures, displacement of the bone segment, or injury to surrounding soft tissues and neurovascular structures.

8. Transport Bone Segment

Under fluoroscopy, confirm completion of the transport segment corticotomy by performing an acute transverse distraction of approximately 5 mm, then return the segment to its original position on the transport arm.

Advance the bone segment using Adjustment Tool (DXT-TTT-18) placed into the Drive Screw of the Adjustment Mechanism. To distract the bone segment, rotate the adjustment knob clockwise, following the “up” direction indicated by the arrow on the device.

To reverse the direction and compress, rotate the adjustment knob counterclockwise, following the “down” direction indicated by the arrow on the device. **FIGURE 29**

FIGURE 29

CAUTION: Perform initial distraction and advancement slowly to avoid damaging the bone segment or surrounding soft tissue.

The Fixation Frame allows for a total of 10.0 mm segment transport. Use the Progress Scale for primary measurement, marks are spaced at 1 mm intervals.

Each knob detent equals 0.25 mm, with four detents per full millimeter.

If the scale aligns with a whole millimeter mark and the Indicator Dots read “1,” the segment is exactly at that position.

If the scale mark is between whole millimeter values, use the Indicator Dots to determine the quarter-millimeter position (e.g., scale between 3 mm and 4 mm, dots read “3” → position is 3.5 mm).

Always read the dots from the same side as the Progress Scale for accuracy.

INSTRUMENTS USED

ADJUSTMENT TOOL

DXT-TTT-18

9. Post Operative Transport

The time period and distraction rates for use of the fixation frame are at the surgeon's discretion. Continue advancement as indicated by the surgical plan.

General TTT Post-Operative Guidelines:

The following guidelines summarize commonly reported postoperative management for tibial cortex transverse transport (TTT) and are provided for general informational purposes only. The latency period, distraction rate, transport schedule, total duration, and weight-bearing progression are determined by the operating surgeon based on patient-specific factors, including wound severity, vascular status, bone quality, and healing response.

Clinical judgment supersedes any generalized schedule presented here.

Immediate Postoperative Period (Day 0–4)
Following frame application and creation of the free transport segment, a latency period of approximately 4 days is typically observed before beginning transport. This rest interval supports early callus formation and soft tissue tolerance prior to distraction.

During this period: confirm corticotomy position and frame alignment with postoperative radiographs; elevate the limb to manage swelling; initiate pin site care; and optimize the patient medically, including glycemic control, nutrition, and management of any active infection. In wound and ulcer cases, surgical debridement and standard wound care are performed concurrently per the surgical plan.

Initiating Distraction (≈ Day 4–5)
After the latency period, begin transport of the segment using the Adjustment Tool in the Drive Screw of the Adjustment Mechanism. Confirm the frame is set to the "Zero" position using the Progress Scale and Indicator Dots before the first adjustment.

A commonly reported distraction rate is 1.0 mm per day, divided into four 0.25 mm adjustments spaced throughout the day. This corresponds to one full revolution of the adjustment knob per day, or one detent (0.25 mm) per adjustment. To advance (distract) the segment, rotate the knob clockwise in the "up" direction indicated on the device.

Perform initial advancement slowly and verify smooth, stress-free segment movement under the surgeon's direction.

Transport Phase
The DYNEX® TRIAD Fixation Frame allows a total running distance of 10.0 mm. The reported transport approach uses an "accordion" technique: the segment is advanced (distracted) in one direction over approximately 2 weeks, then reversed (compressed) back toward its original position over approximately 2 weeks, for a total transport phase of roughly 4 weeks.

Returning the segment to its original position reduces the risk of residual tibial deformity, soft tissue penetration, and corticotomy-site complications.

INSTRUMENTS USED

ADJUSTMENT TOOL

DXT-TTT-18

To reverse direction (compress), rotate the adjustment knob counterclockwise in the "down" direction indicated on the device. Throughout transport, use the Progress Scale as the primary measurement (1 mm intervals) and the Indicator Dots to confirm the precise quarter-millimeter position, always reading the dots from the same side as the scale.

Monitoring and Recheck
Patients are typically followed closely during the active transport phase and at regular intervals thereafter. Reported follow-up schedules include weekly evaluation through the first ~12 weeks postoperatively, then every 3 months until healing and consolidation are confirmed. At each visit, assess: pin sites for signs of infection; the transport segment and corticotomy position by radiograph; wound or ulcer healing progress; and limb perfusion and patient comfort. Partial weight-bearing with assistive devices is commonly permitted early, advancing per the surgeon's direction.

Docking and Consolidation
Once the segment has returned to its original position (completion of the accordion cycle) and radiographs confirm acceptable cortex apposition at the docking site, the transport phase is complete. The construct is then maintained to allow consolidation and union of the osteotomized cortex. Reported radiographic union of the cortex occurs in the range of several weeks following completion of transport.

Frame Removal
When radiographs confirm adequate union of the transported cortex, remove the frame per Section 10. Following removal, weight-bearing is typically advanced toward full weight-bearing under the surgeon's direction.

INSTRUMENTS USED

ADJUSTMENT TOOL

DXT-TTT-18

10. Fixation Frame Removal

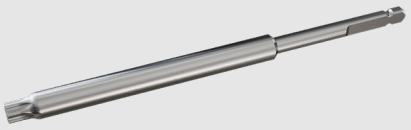
Ensure the transport arm is set to the desired position for removal of the bone fragment.

Loosen all Half Pin clamps and Transport Pin Clamps using the T30 Driver.

Remove the DYNEX Triad frame from the pins and remove the pins with the pin driver or a power drill.

If applicable, remove DYNEX Circular Ring Fixation as outlined in the DYNEX® Surgical Technique. (Document # QSD 8.13-19)

INSTRUMENTS USED



T30 DRIVER

DXT-TTT-13

DYNEX® TRIAD Surgical Technique

PART REFERENCE GUIDE

TRIAD Fixation Frame Components

Part Number	Description
DXT-35-80	DYNEX TRIAD Ø3.5mm Transport Pin 80mm
DXT-35-130	DYNEX TRIAD Ø3.5mm Transport Pin 130mm
DXT-TTT-01	DYNEX TRIAD Fixation Frame
DXT-TTT-21	DYNEX TRIAD Ring Adaptor - Short
DXT-TTT-22	DYNEX TRIAD Ring Adaptor - Long

TRIAD Fixation Frame Instruments

Part Number	Description
DXT-TTT-02	DYNEX TRIAD Cutting Guide
DXT-TTT-03	DYNEX TRIAD Drill Guide
DXT-TTT-04	DYNEX TRIAD Drill Guide LRG
DXT-TTT-05	DYNEX TRIAD 2.5mm Drill
DXT-TTT-06	DYNEX TRIAD 2.5mm Drill LRG
DXT-TTT-07	DYNEX TRIAD Pin Driver
DXT-TTT-08	DYNEX TRIAD Osteotome
DXT-TTT-09	DYNEX TRIAD 3.2mm Drill Guide
DXT-TTT-10	DYNEX TRIAD 4.5mm Drill Guide
DXT-TTT-11	DYNEX TRIAD 3.2mm Drill
DXT-TTT-12	DYNEX TRIAD 4.5mm Drill
DXT-TTT-13	DYNEX TRIAD T30 Driver
DXT-TTT-14	DYNEX TRIAD 3.2mm Trocar
DXT-TTT-15	DYNEX TRIAD 4.5mm Trocar
DXT-TTT-16	DYNEX TRIAD 2.5mm Trocar
DXT-TTT-17	DYNEX TRIAD 2.5mm Trocar LRG
DXT-TTT-18	DYNEX TRIAD Adjustment Tool
DXT-TTT-19	DYNEX TRIAD Cut Guide Insert
DXT-TTT-20	DYNEX TRIAD Cut Guide Pin Bushing
DXT-TTT-23	DYNEX TRIAD 7mm Wrench
DI222075R	Burr, Isham Straight Flute 2.2x20x75mm
H254	Ratcheting AO Handle
K150-20S	K-Wire, Ø2.0 x 150mm, Single Trocar Tip

TRIAD Half Pins

Part Number	Description
DS-HP45-150-25N	Ø 4.5mm Half Pin, 150mm x 25mm
DS-HP45-150-30N	Ø 4.5mm Half Pin, 150mm x 30mm
DS-HP45-150-35N	Ø 4.5mm Half Pin, 150mm x 35mm
DS-HP45-150-40N	Ø 4.5mm Half Pin, 150mm x 40mm
DS-HP45-150-45N	Ø 4.5mm Half Pin, 150mm x 45mm
DS-HP45-150-50N	Ø 4.5mm Half Pin, 150mm x 50mm
DS-HP45-150-55N	Ø 4.5mm Half Pin, 150mm x 55mm
DS-HP60-150-25N	Ø 6.0mm Half Pin, 150mm x 25mm
DS-HP60-150-30N	Ø 6.0mm Half Pin, 150mm x 30mm
DS-HP60-150-35N	Ø 6.0mm Half Pin, 150mm x 35mm
DS-HP60-150-40N	Ø 6.0mm Half Pin, 150mm x 40mm
DS-HP60-150-45N	Ø 6.0mm Half Pin, 150mm x 45mm
DS-HP60-150-50N	Ø 6.0mm Half Pin, 150mm x 50mm
DS-HP60-150-55N	Ø 6.0mm Half Pin, 150mm x 55mm

Learn more about the
DYNEX® TRIAD System

TRIAD

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QSD 8.13-46 REV B
JUN 2026