



HTO Hinge Pin and FreeCut Systems

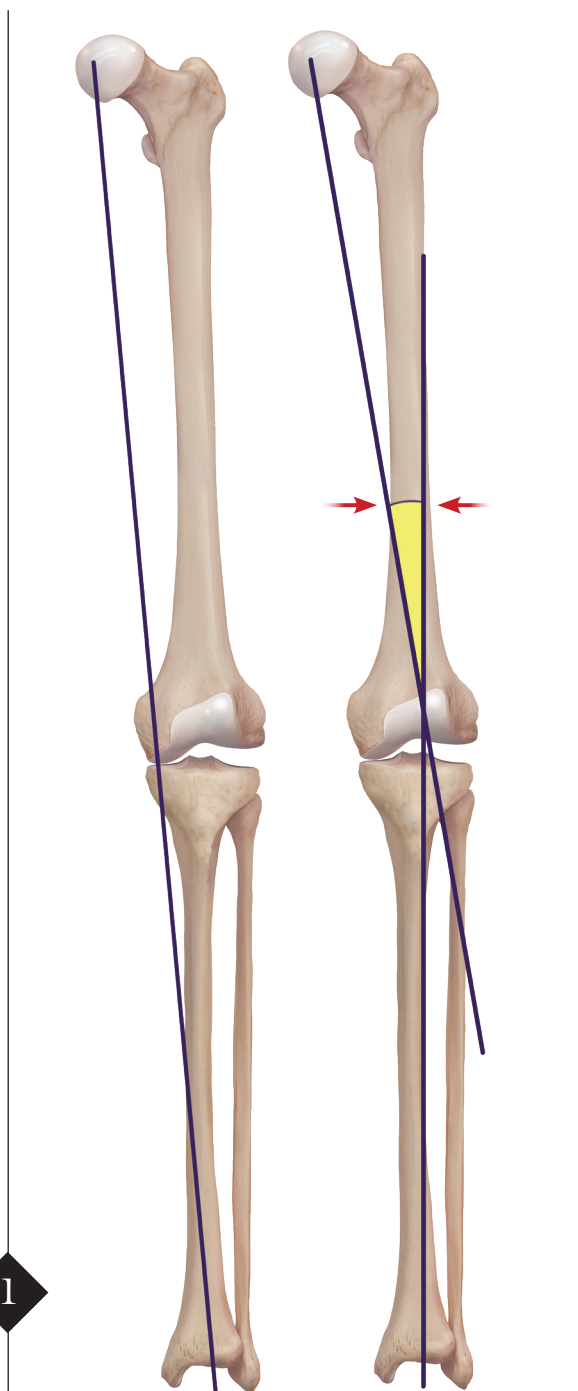
Surgical Technique



Hinge Pin and FreeCut Systems

HTO Hinge Pin and FreeCut Techniques

Required steps for both techniques

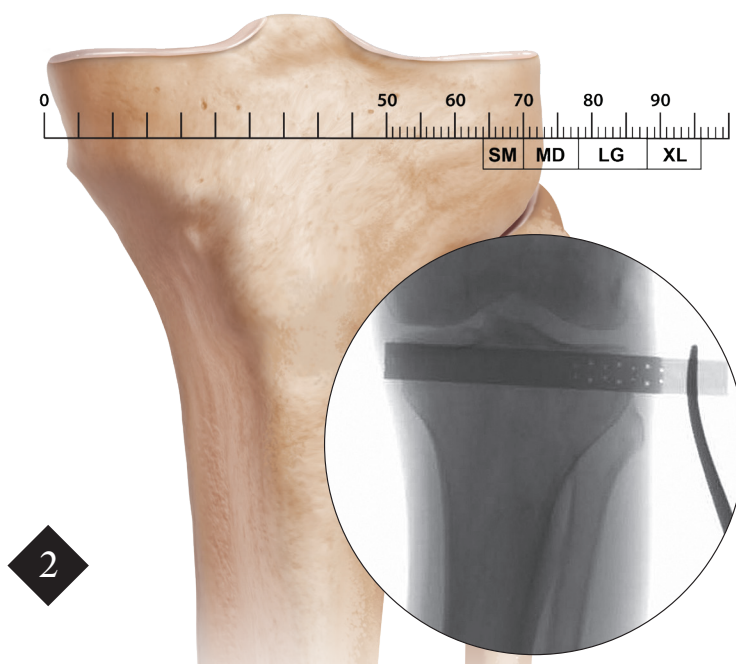


Using the full-length standing AP radiograph, draw a line from the center of the femoral head to the center of the tibiotalar joint. This demonstrates the patient's mechanical axis. Draw another line from the center of the femoral head to a midway point* in the lateral knee joint. Draw a final line from the center of the tibiotalar joint to the same point in the lateral knee joint. The angle formed by the intersection of these 2 lines determines the degree of correction required to return the patient's mechanical axis to the point of intersection on the lateral side. Prior to final fixation, verify the alignment by external examination and fluoroscopy.

*This point is located at 62.5% of the width of the proximal tibia (ie, 80 mm [width to proximal tibial] \times 0.625 = 50 mm).

Correction (degrees)	Corresponding Medial Opening			
	Small (mm)	Medium (mm)	Large (mm)	Extra Large (mm)
5		6.26	6.62	7.69
6	6.26	7.25	7.69	8.76
7	7.25	8.25	8.76	9.83
8	8.25	9.25	9.83	10.90
9	9.25	10.25	10.90	11.98
10	10.25	11.25	11.98	13.05
11	11.25	12.26	13.05	14.13
12	11.25	13.26	14.13	15.21
13	12.26	14.27	15.21	16.29
14	13.26	15.28	16.29	17.38
15	14.27	16.29	17.38	

If an iBalance® HTO implant is used, verify the implant size prior to making skin incision.



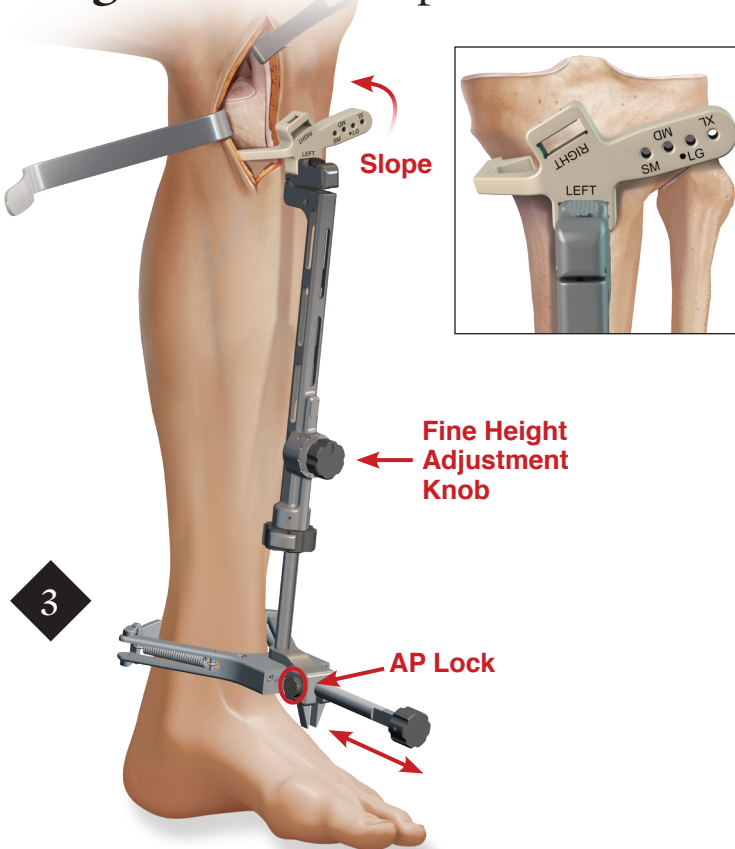
Confirm the tibial width measurement intraoperatively using AP fluoroscope imaging and the iBalance steel ruler. Obtain measurements both anterior and posterior to the proximal tibia and average the 2 readings for the tibial plateau width. This method provides compensation for parallax and magnification of the fluoroscope image, and confirms the preoperative planning.

$$\text{Tibial width} = (\text{width anterior} + \text{width posterior}) \div 2$$

Estimate the iBalance HTO system instrument size using this table:

Small (SM)	Medium (MD)	Large (LG)	X-Large (XL)
64 mm-70 mm	70 mm-78 mm	78 mm-88 mm	88 mm-96 mm

Hinge Pin First: Steps 3-10

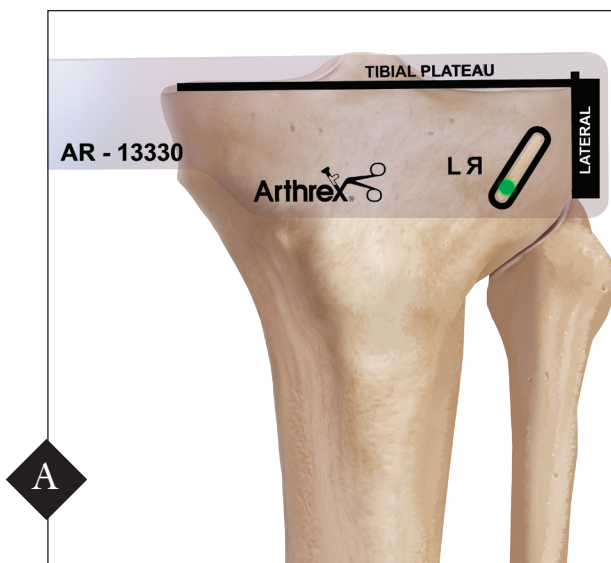


3 Assemble the extramedullary (EM) guide and the PEEK hinge pin attachment ordained such that the correct operative side is identified.



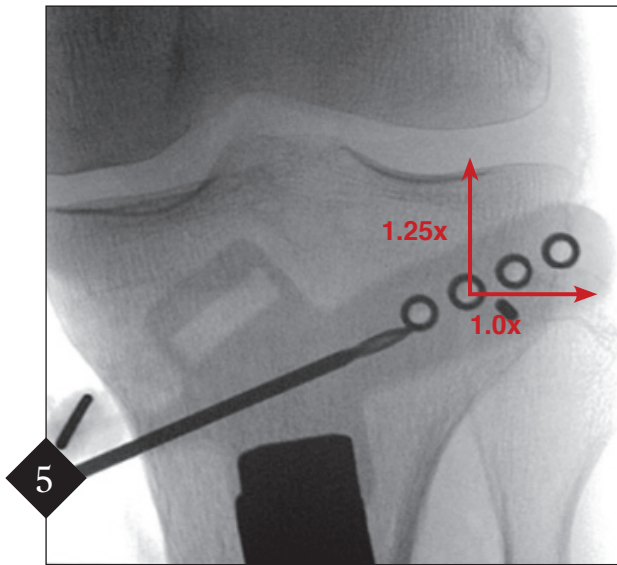
4 Place the extramedullary (EM) guide on the operative limb. Adjust the working height and position the PEEK hinge pin guide such that the medial arm is in the approximate location of the desired osteotomy. The guide should be approximately parallel to the tibial crest. The posterior tip of the guide should be positioned on the posterior/medial most aspect of the tibia.

Alternative Sequence to Steps 3-10: Guidewire First (A-D)

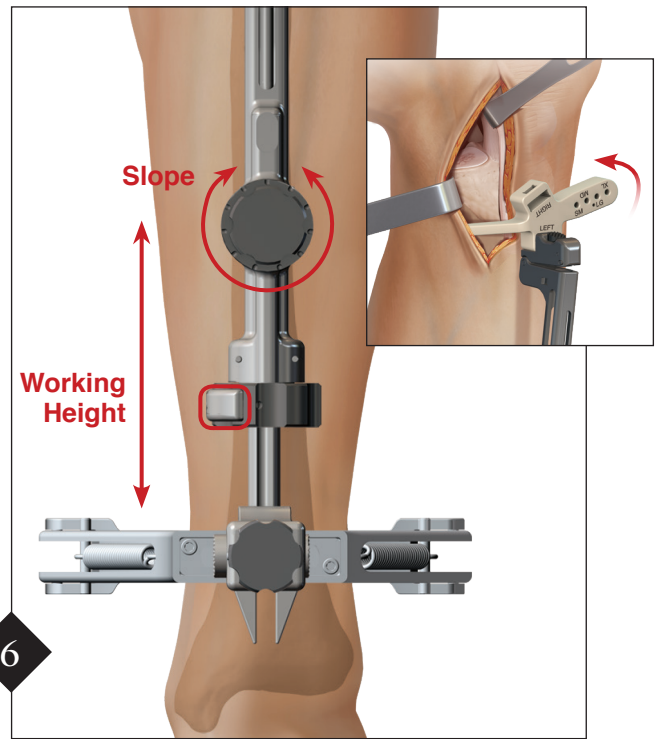


A Identify Gerdy's tubercle with a sterile skin marker as the approximate location for the entry point of the hinge pin. This location can optionally be identified under fluoroscopy with the use of the hinge pin template.

Under X-ray, the lateral tibial plateau has to be seen in line and $\frac{1}{3}$ of the fibula head is projected through the tibia. The horizontal aspect of the template should be aligned with the tibial plateau, and the vertical aspect with the lateral aspect of the tibia. The skin may be marked through the oval at the proximal level of the fibular head.

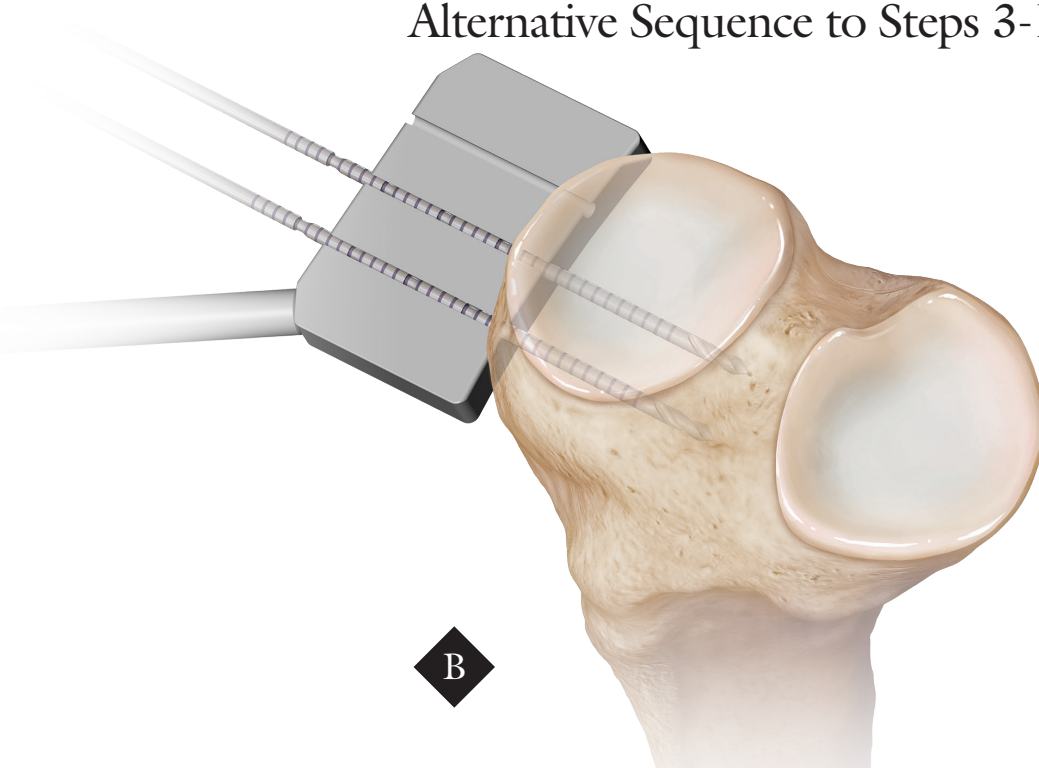


With the assistance of a true anteroposterior (AP) fluoroscopic image, confirm that the hole associated with the determined component size is in the appropriate position (approximately 1.25 times greater than the distance from the hinge pin to the nearest lateral cortex).

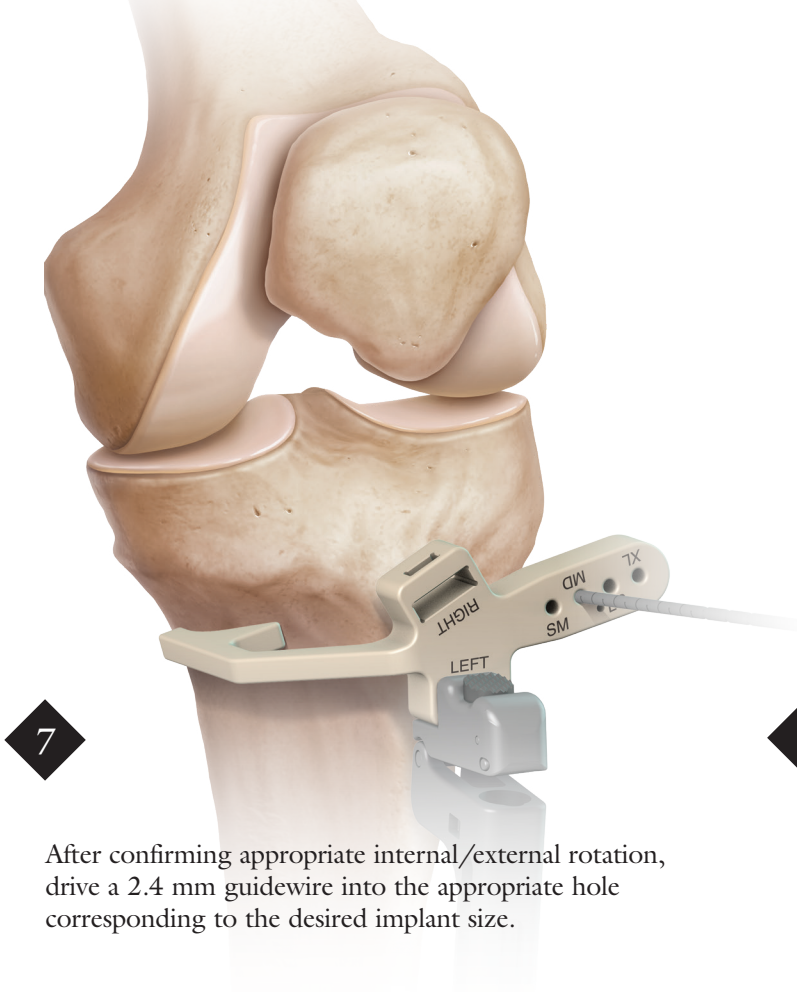


With the assistance of lateral fluoroscopy, adjust the slope and working height on the EM guide.

Alternative Sequence to Steps 3-10

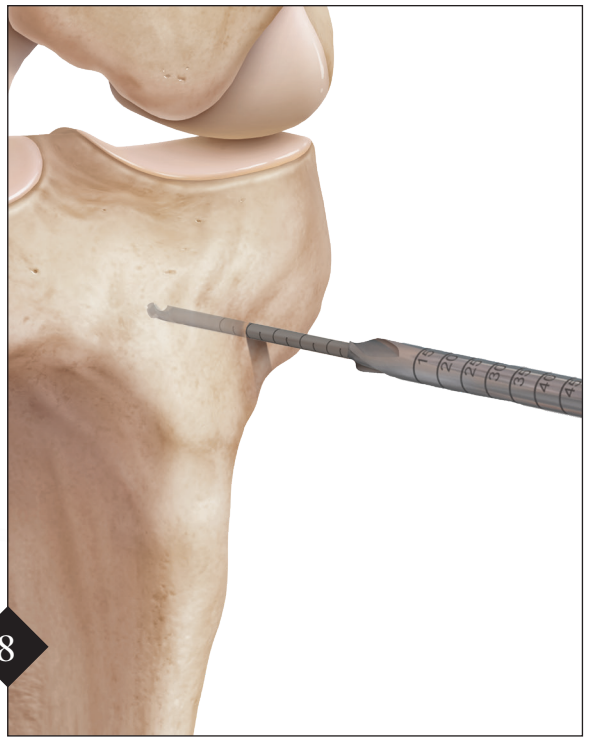


Insert two 2.4 mm breakaway guide pins in the conventional method. The angle of the osteotomy should be angled towards the termination point identified in the previous step. It is recommended that the cutting guide is used to ensure the appropriate distance and ensure the parallel nature of the guide pins.



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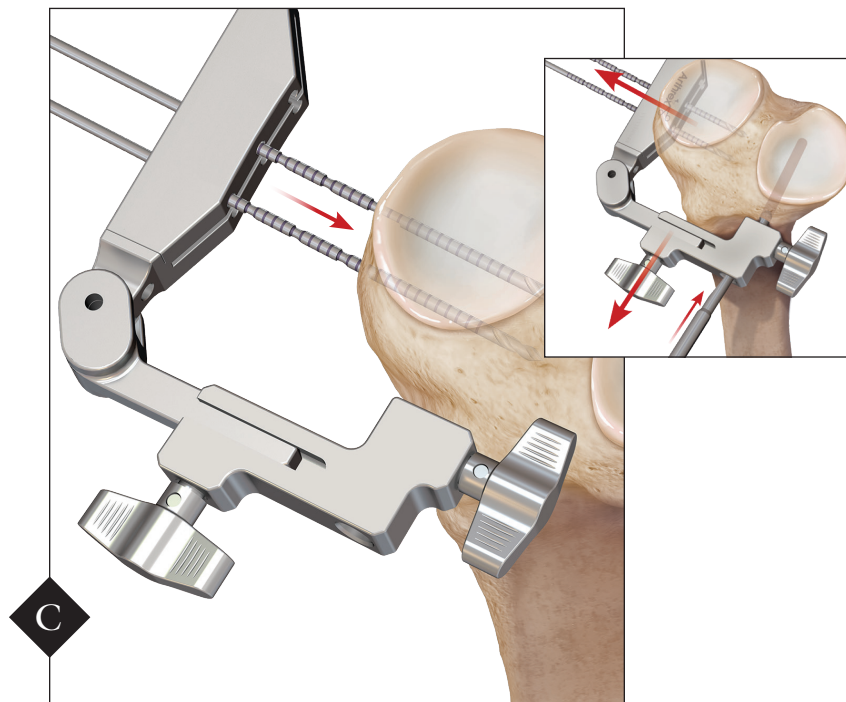
After confirming appropriate internal/external rotation, drive a 2.4 mm guidewire into the appropriate hole corresponding to the desired implant size.



8

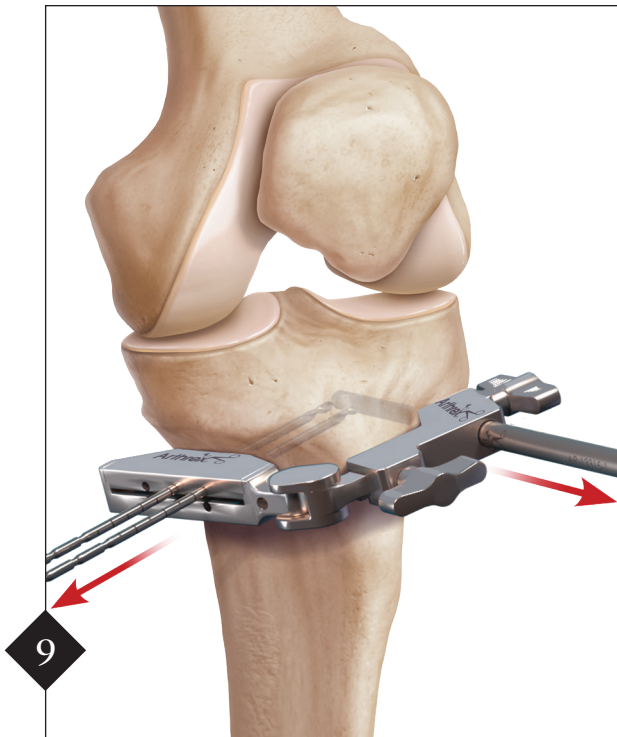
Remove the EM guide and ream over the guidewire with a 5 mm reamer.

Alternative Sequence to Steps 3-10

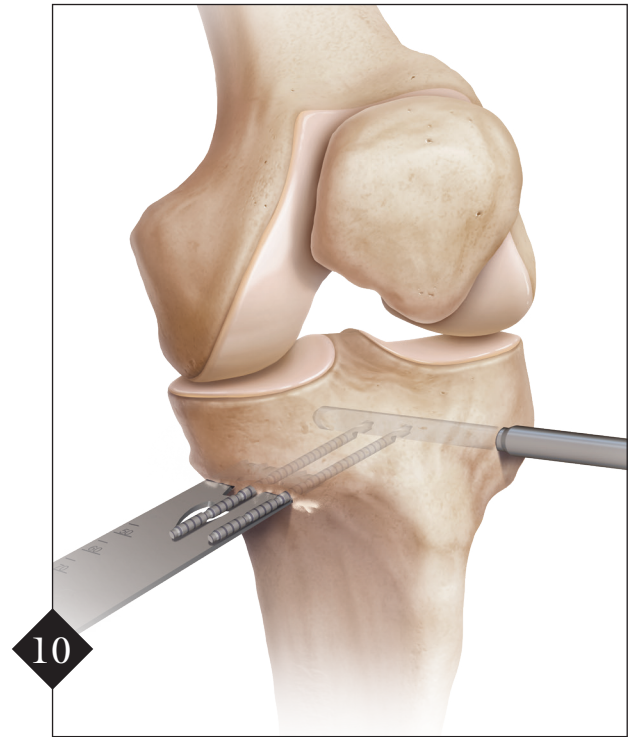


C

Replace the cutting guide with the hinge pin cutting guide. Adjust the articulating arm so that the hinge pin hole is aligned approximately over the skin mark created earlier (Gerdy's tubercle). Use a 5 mm cannulated reamer to drill the hinge pin hole. *Take care to ensure proper internal/external rotation is established.* Insert the hinge pin and remove the hinge pin cutting guide.



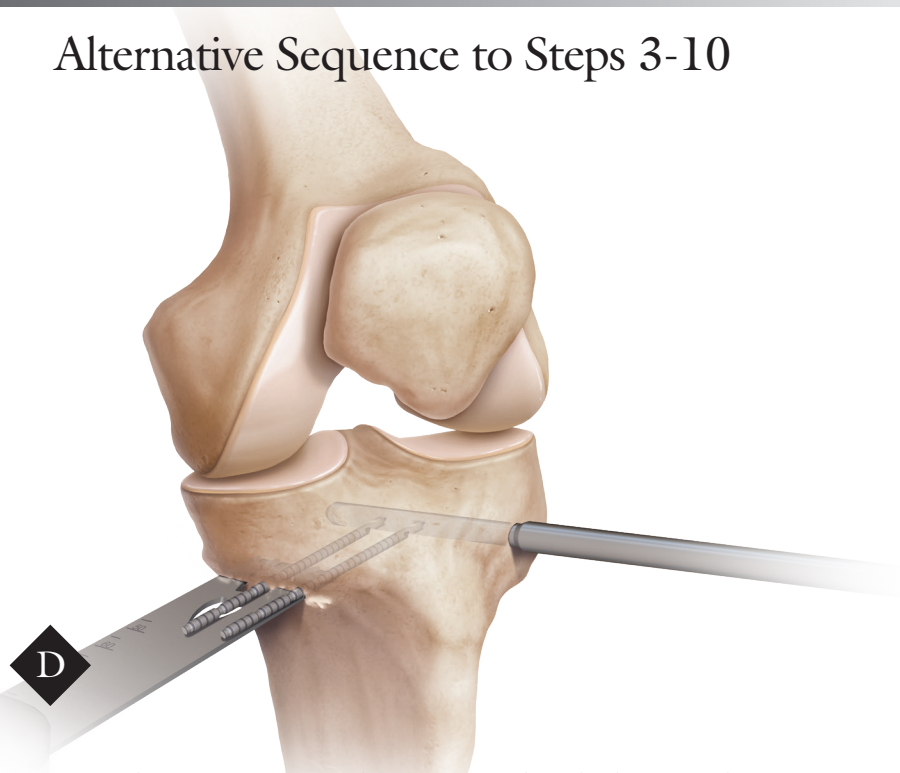
Remove the hinge pin cutting guide.



Create the osteotomy using the conventional method. Start with a sagittal saw and finish with flexible osteotomes. The osteotomy should terminate completely at the hinge pin. Fluoroscopic confirmation should be checked repeatedly throughout the cutting process.

If the iBalance® PEEK wedge implant will be used, proceed with step 11. If the ContourLock™ HTO plate system will be used, open the osteotomy using the conventional method and apply the plate.

Alternative Sequence to Steps 3-10



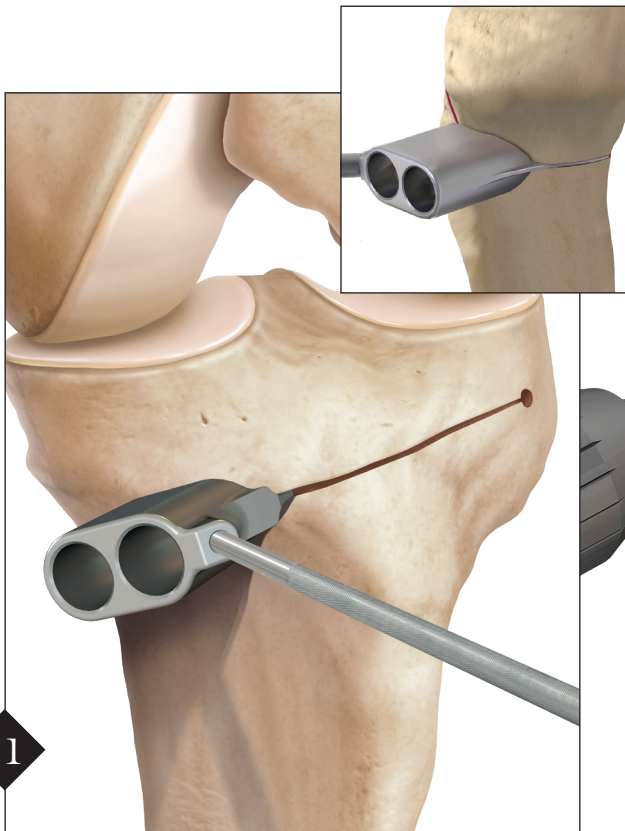
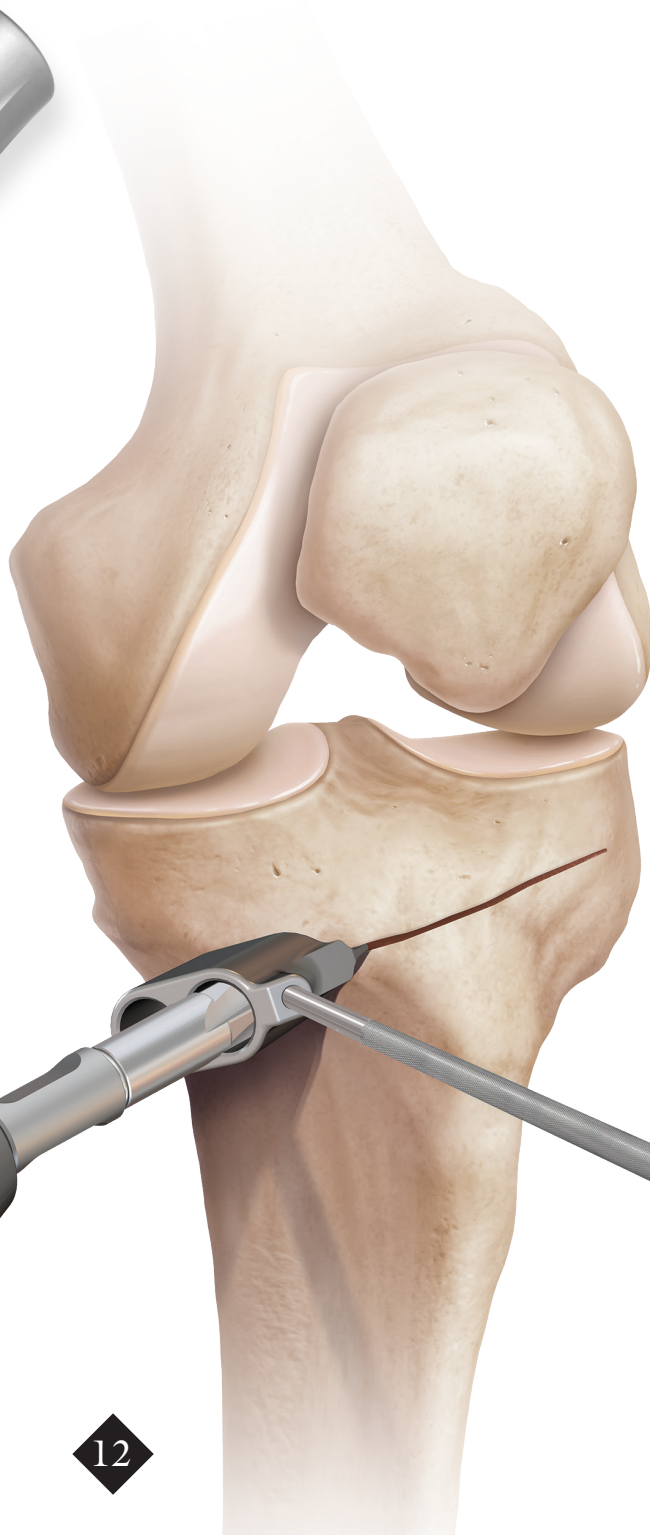
Create the osteotomy using the conventional method. Start with a sagittal saw and finish with flexible osteotomes. The osteotomy should terminate completely at the hinge pin. Fluoroscopic confirmation should be checked repeatedly throughout the cutting process.

If the iBalance® PEEK wedge implant will be used, proceed with step 11. If the ContourLock™ HTO plate system will be used, open the osteotomy using the conventional method and apply the plate.

iBalance® HTO FreeCut Keyhole Guide



iBalance HTO Implant, LG 5° (AR-13400L-05)

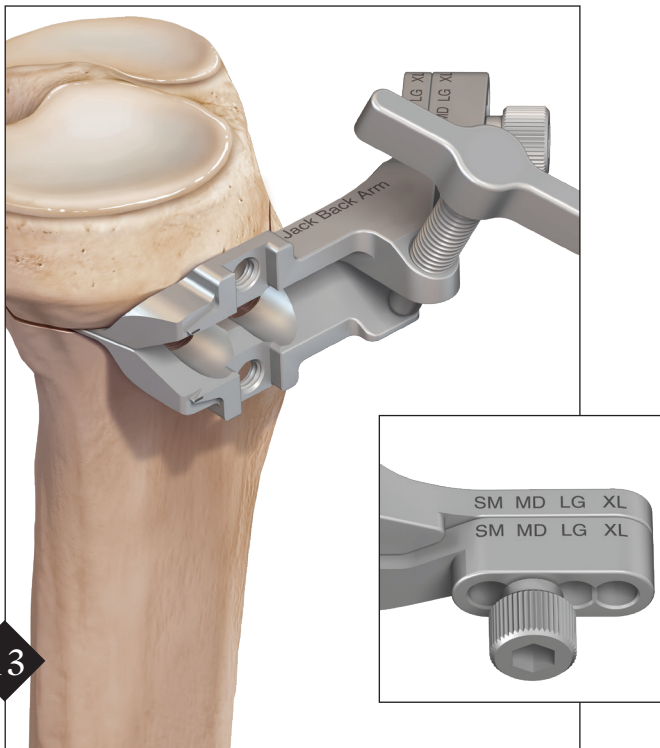


11

Insert the appropriately sized FreeCut keyhole guide. The posterior medial aspect of the guide represents the posterior flange of the implant. This flange should align with cortical bone and the posterior medial aspect of the tibia.

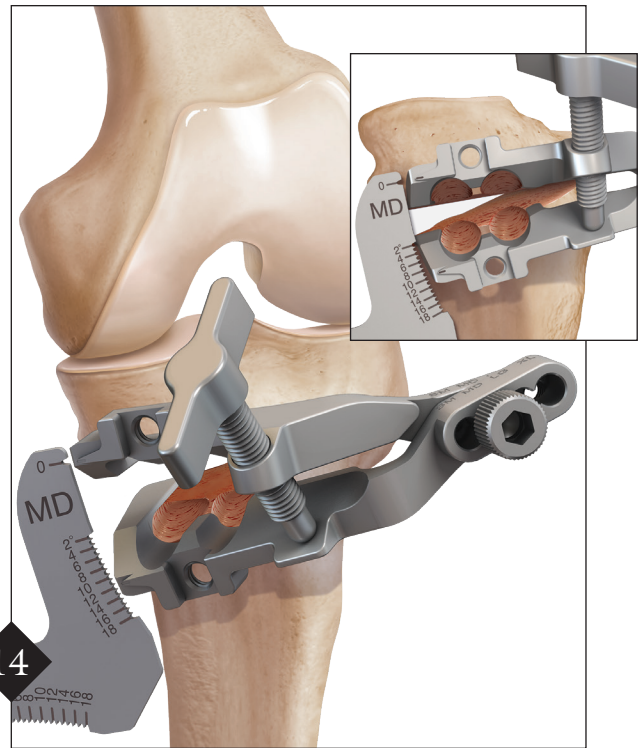
12

Drill both keyhole lugs. After the first hole is drilled, the keyhole lug stabilizer may be inserted to ensure proper alignment of the guide while the second lug is prepared.



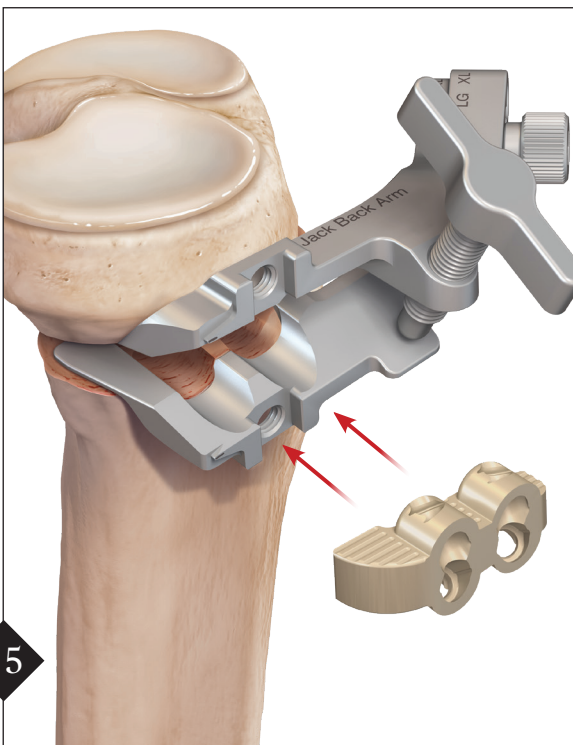
13

Confirm the opening hinge of the iBalance® opening jack is set for the appropriate component size. Insert the fully closed opening jack paddles into the osteotomy. Align the opening jack to the keyholes with the provisional pin.



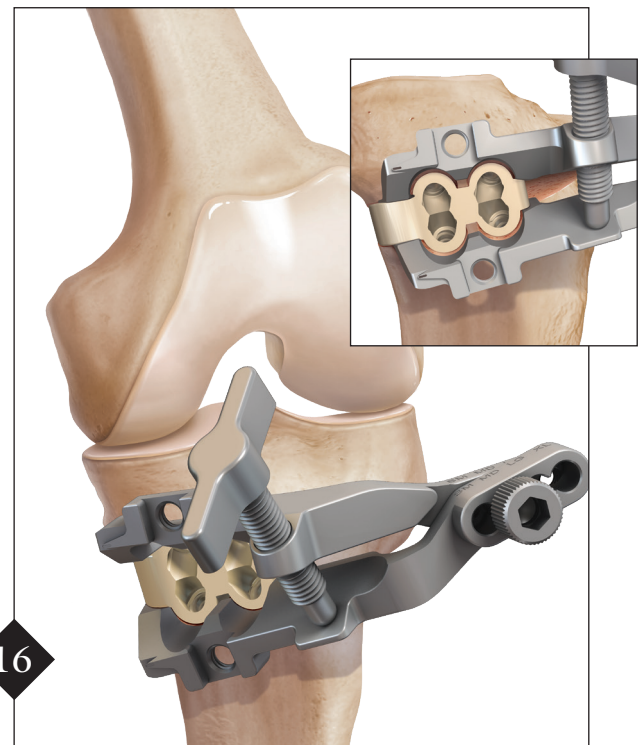
14

Very slowly, open the jack by turning the turnkey handle until the planned correction angle is noted on the correction guide. It is important to rotate the turnkey slowly over several minutes to allow for stress relaxation of the lateral cortex. To allow for compression of graft material, variation in accuracy, and insertion of the implant, open the jack approximately 1-3 additional degrees. Press fit the graft material into the osteotomy using the graft tamp. Pack the graft material beyond the opening jack paddles to avoid over filling.



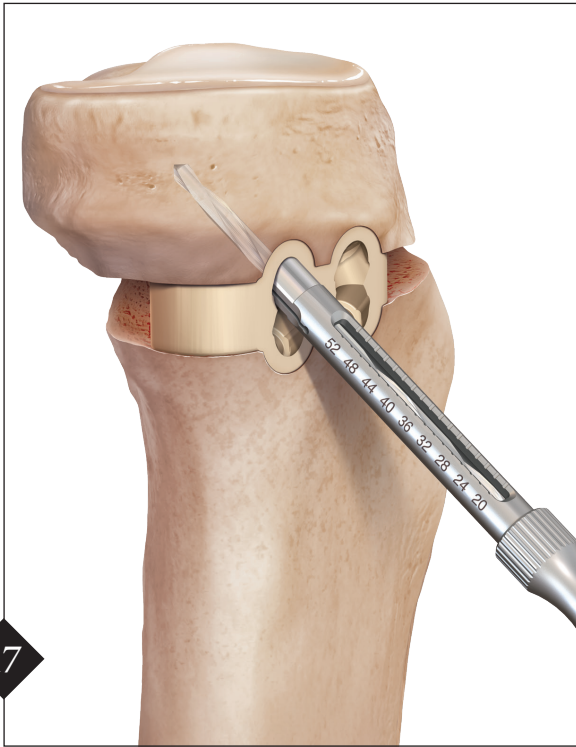
15

Open the sterile implant package that matches the planned correction angle. Insert the iBalance HTO implant through the opening jack jaws into the osteotomy and keyholes.

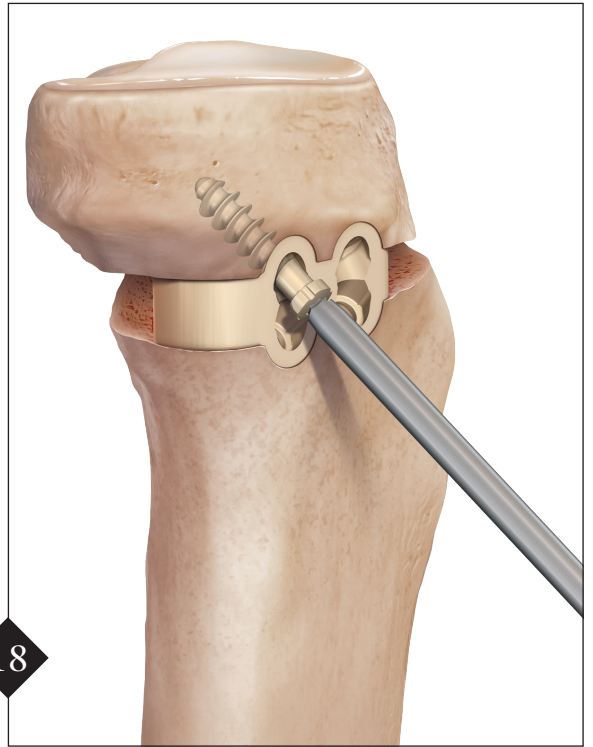


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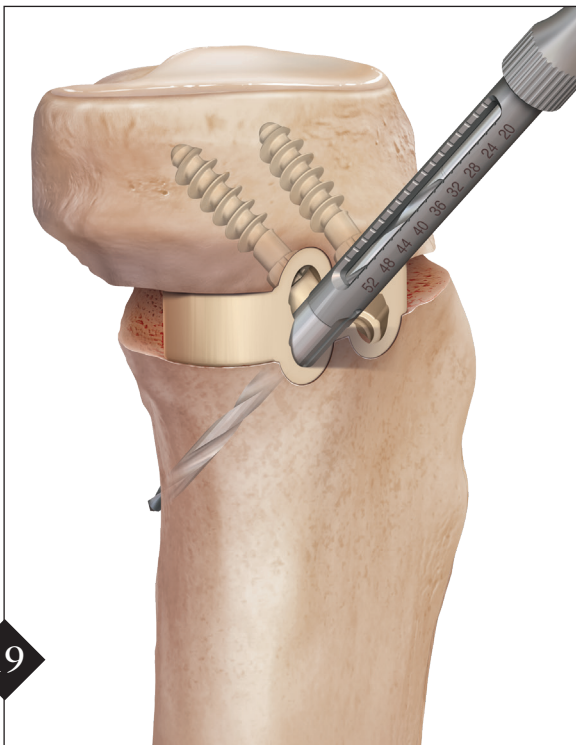
Push in and seat the implant into the wedge and keyholes. Ensure that the implant keys fit cleanly into the drilled keyholes. Check alignment with the anteromedial and posteromedial surfaces. Disassemble and remove the opening jack components from the osteotomy, leaving the iBalance HTO implant in place.



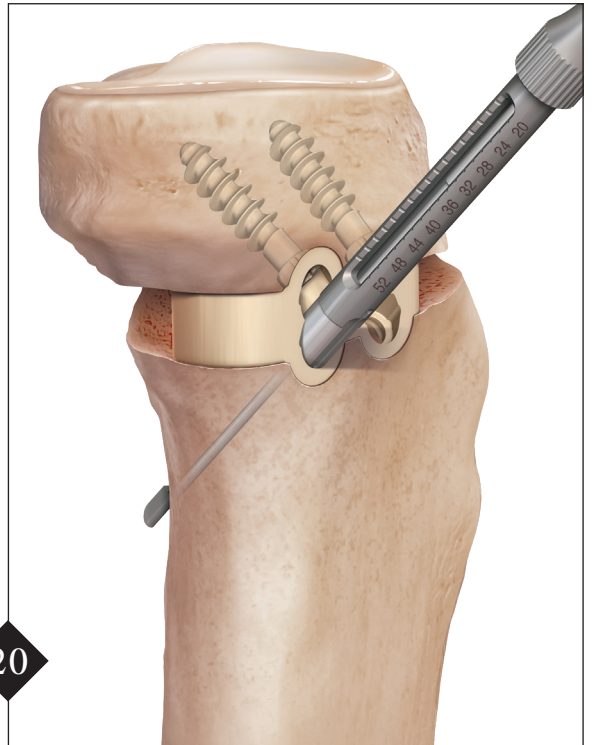
Insert the drill guide into the posterior proximal hole of the implant so that it fits closely and the index marks and numbers are visible. Slide the anchor drill through the drill guide and drill into the tibia, ensuring that the drill tip remains below the inferior chondral bone of the tibial plateau. Monitor drilling under fluoroscopic imaging.



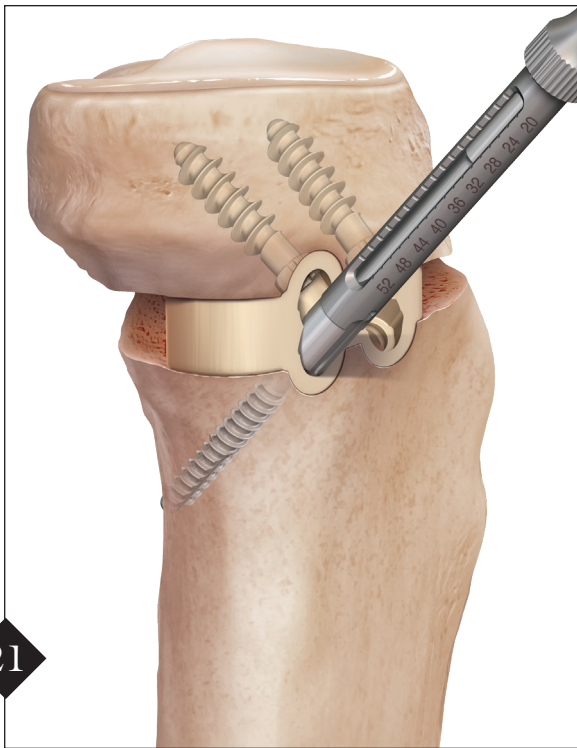
Slide the anchor depth device through the drill guide into the drilled hole until it bottoms out. Determine the proper cancellous anchor length using the depth device. Use the anchor driver to advance the cancellous anchor through the implant into bone. Tighten the anchor until the entire head recesses just below the implant surface, then advance another quarter turn. Repeat for the other proximal hole of the implant.



Insert the drill guide into the posterior distal hole of the implant until it fully seats. Adjust the guide until the index marks and numbers are visible. Slide the anchor drill through the guide and drill into the tibia, ensuring that the drill tip passes completely through the distal cortex of the tibia.

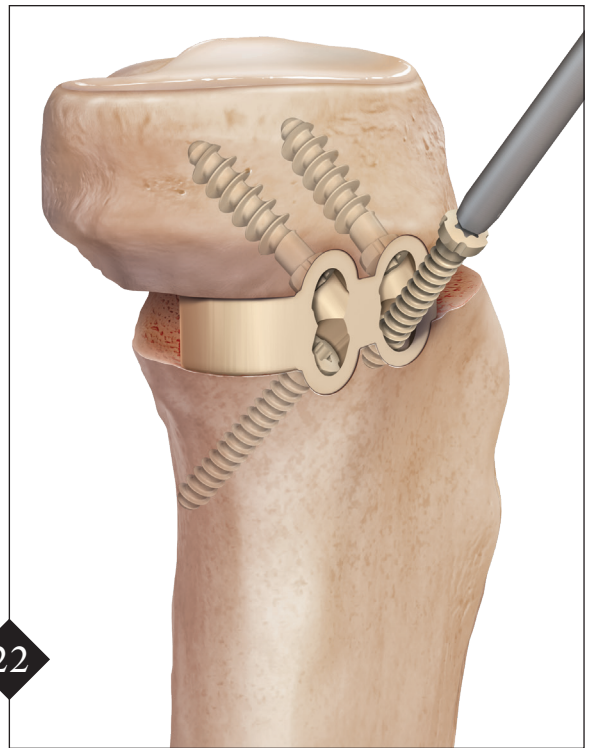


Remove the drill and slide the anchor depth device through the drill guide and drilled hole, hooking the distal cortex. Determine the length of the cortical anchor by selecting the closest aligned index mark on the depth device.



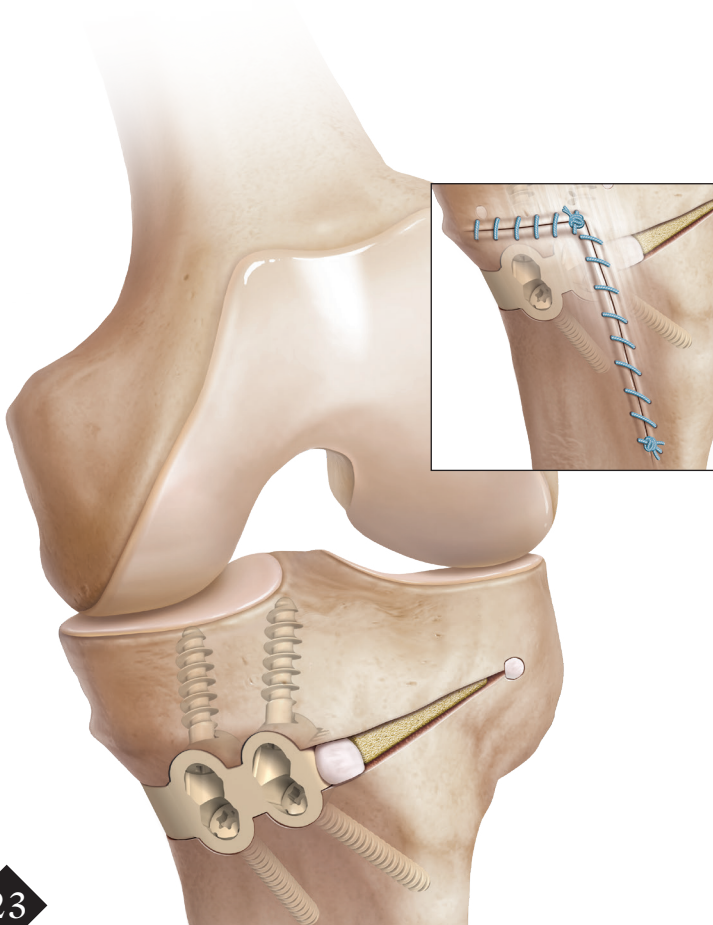
21

Remove the anchor depth device. Insert the tap guide into the implant and tap the drilled hole with the cortical tap to the measured depth.



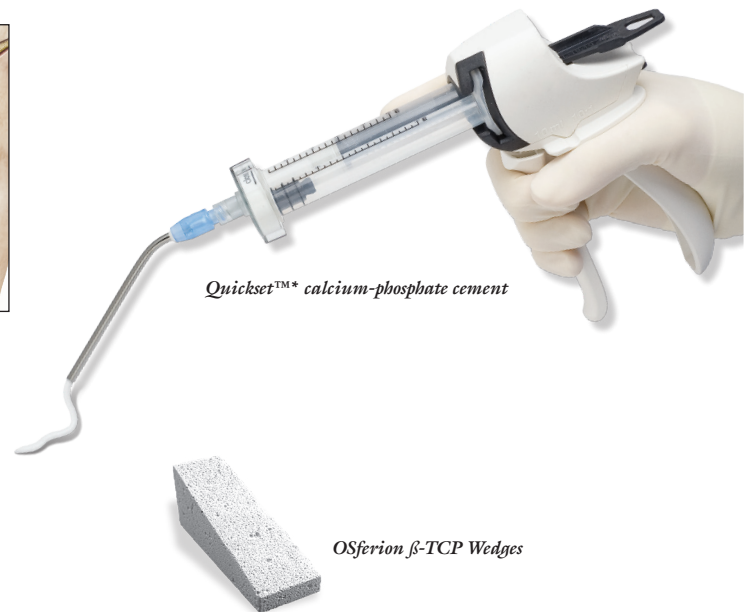
22

Using the anchor driver, insert the cortical anchor through the implant into bone until it engages the far side of the cortex. Tighten the anchor until the entire head is just below the implant surface, then advance another quarter turn. Repeat the above steps for the other distal hole.



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Lay the subcutaneous tissue flap over the iBalance® HTO implant and suture in place. Close and dress the knee incision.



Quickset™ calcium-phosphate cement

OSferion β-TCP Wedges

ORDERING INFORMATION

<i>iBalance</i> [®] HTO Instrument Set	AR-13400S
<i>Opening Wedge Osteotomy System Set</i>	AR-13330S
<i>iBalance Implants</i>	
iBalance HTO Implant, SM 12°	AR-13400S-12
iBalance HTO Implants, SM 6°/MD 5° – SM 15°/MD 13°	AR-13400M-05-13
iBalance HTO Implant, MD 14° and 15°	AR-13400M-14 & 15
iBalance HTO Implant, LG 5°	AR-13400L-05
iBalance HTO Implants, LG 6°/XL 5° – LG 15°/XL 14°	AR-13400L-06-15
<i>iBalance Anchors</i>	
iBalance HTO Anchors, cancellous, 20 mm-32 mm	AR-13401-20-32
iBalance HTO Anchors, cortical, 24 mm-52 mm	AR-13402-24-52
<i>ContourLock HTO Plates</i>	
ContourLock HTO Plate, flat, left, 67 mm	AR-13730-01
ContourLock HTO Plate, flat, left, 71 mm	AR-13730-02
ContourLock HTO Plate, flat, left, 84 mm	AR-13730-03
ContourLock HTO Plate, flat, right, 67 mm	AR-13735-01
ContourLock HTO Plate, flat, right, 71 mm	AR-13735-02
ContourLock HTO Plate, flat, right, 84 mm	AR-13735-03
<i>Screws</i>	
Cancellous Screws, 6.5 mm × 35 mm-70 mm	AR-13280-35-70
Cortical Screws, 4.5 mm × 34 mm-58 mm	AR-13380-34-58
<i>Bone Graft Substitute</i>	
Quickset Cement, 5 cc Kit	ABS-3005
Quickset Cement, 8 cc Kit	ABS-3008
Quickset Cement, 16 cc Kit	ABS-3016
OSferion Osteotomy Wedge, 7 mm × 30 mm	AR-13370-1
OSferion Osteotomy Wedge, 10 mm × 30 mm	AR-13370-2
OSferion Osteotomy Wedge, 12 mm × 35 mm	AR-13370-3
OSferion Osteotomy Wedge, 15 mm × 35 mm	AR-13370-4



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