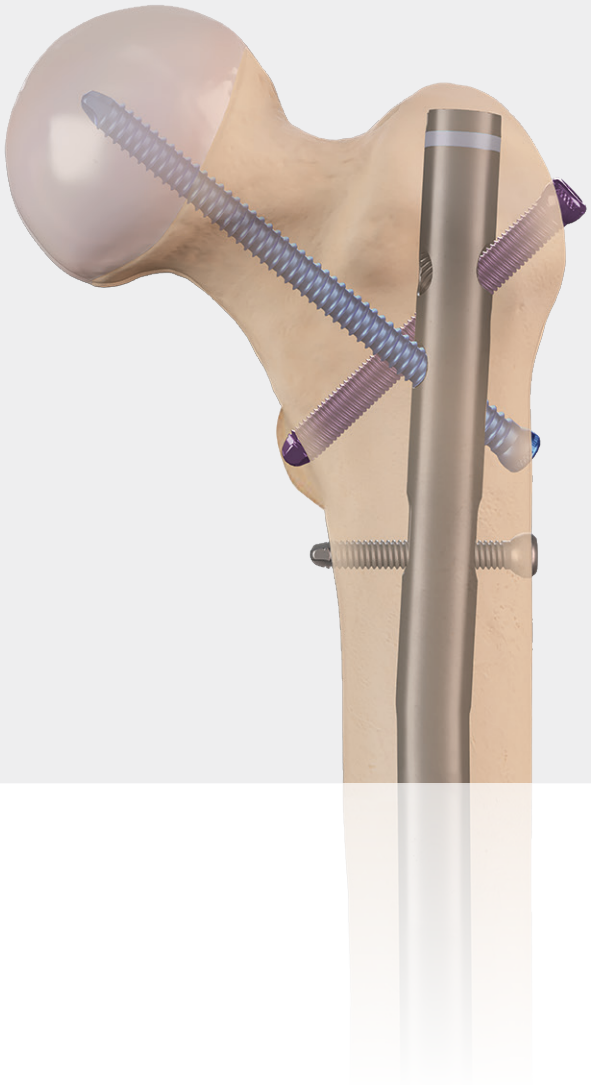
Arthrex Antegrade Femoral Nail System

Surgical Technique



Arthrex®

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Arthrex Antegrade Femoral Nail System

Introduction

Indications

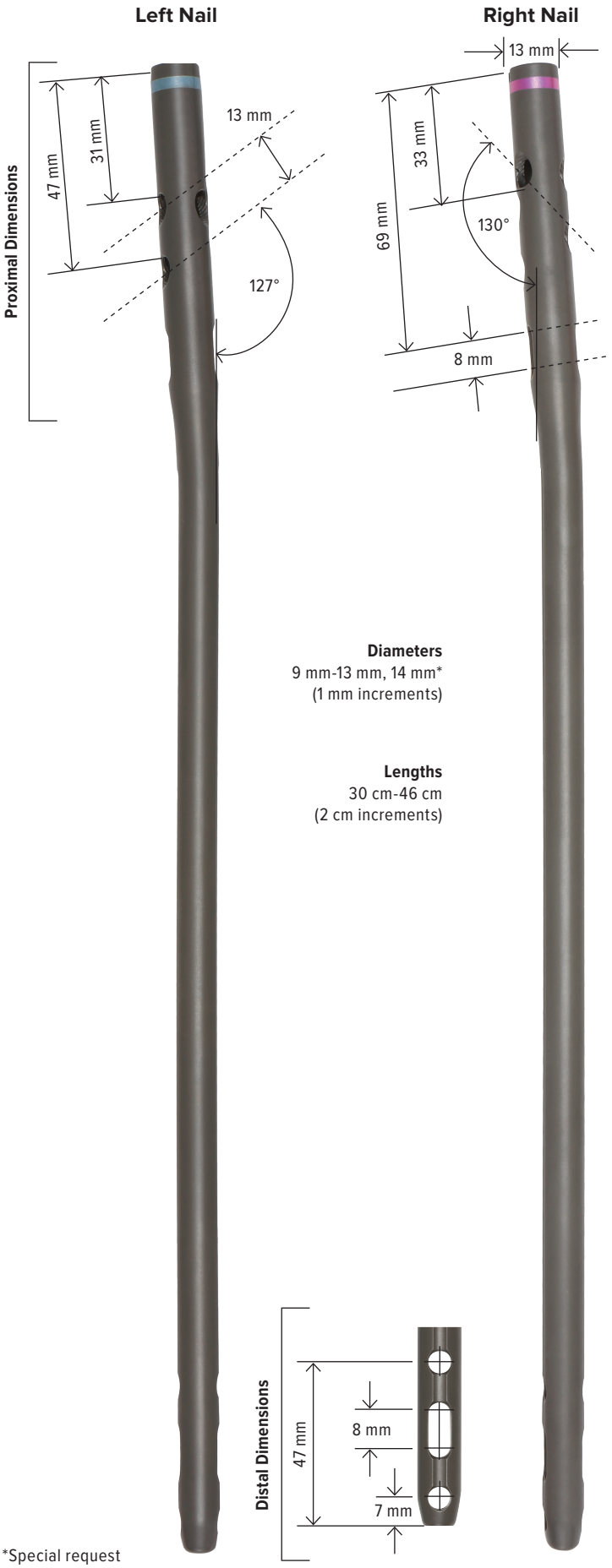
The Antegrade Femoral Nail System is intended for use in intramedullary fixation of fractures of the femur to include the following:

- Open and closed femoral fractures
- Pseudoarthrosis and correction osteotomy
- Pathologic fractures, impending pathologic fractures, and tumor resections
- Supracondylar fractures, including those with severe comminution and intra-articular extension
- Ipsilateral femur fractures
- Bone lengthening
- Fractures proximal to a total knee arthroplasty or prosthesis
- Fractures distal to the hip joint
- Nonunions and malunions
- Fractures resulting from osteoporosis

Preoperative Planning

Preoperative planning is recommended before beginning the surgical procedure. AP and lateral x-rays of the injured femur should be taken preoperatively and evaluated for nail length, canal size, expected amount of reaming, and screw length. AP and lateral x-rays of the contralateral uninjured femur can also be used to provide insight into the anatomy of the pre-injured femur.

Implant Features

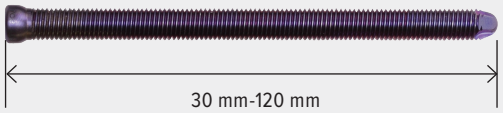


Diameters
9 mm-13 mm, 14 mm*
(1 mm increments)

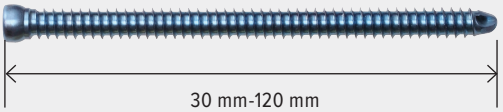
Lengths
30 cm-46 cm
(2 cm increments)

*Special request

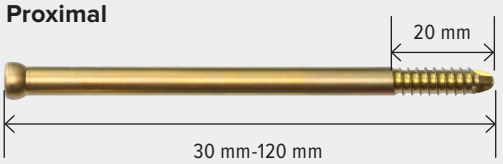
6.5 mm Captured Cortical Screw, Proximal



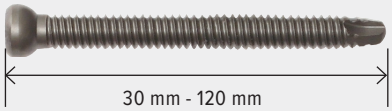
6.5 mm Captured Cancellous Screw, Proximal



6.0 mm Captured Partially Threaded Screw, Proximal



5 mm Captured Cortical Bone Screw, Distal and Transverse

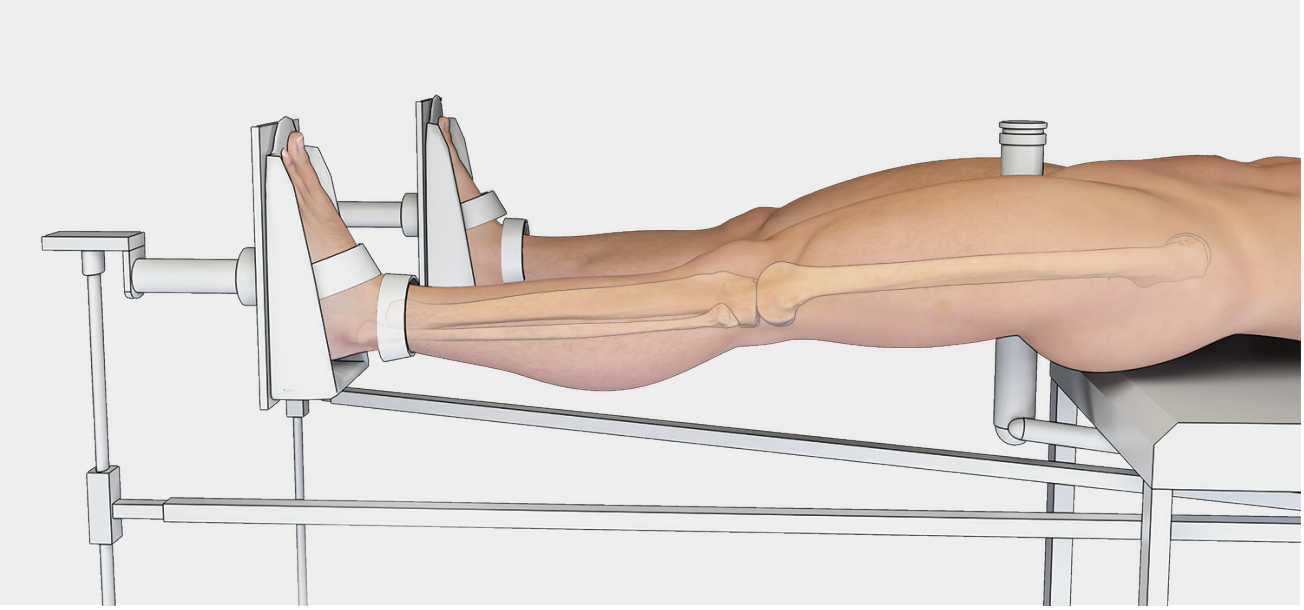


Captured End Caps

Recon Locking End Cap

Locking Spacer

Patient Positioning

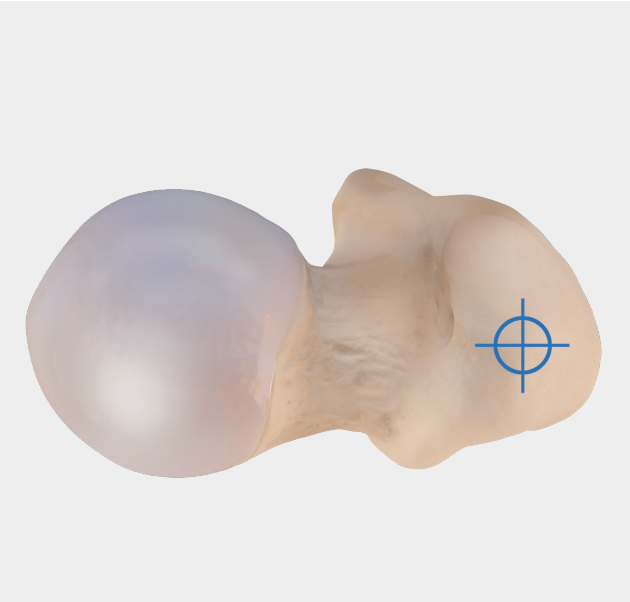


The patient should be positioned in a supine position on a fracture table or radiolucent table. The use of a fracture table can be beneficial during fracture reduction by providing in-line traction and facilitating intraoperative imaging with a C-arm. The C-arm should be positioned to allow for imaging of the femur in both planes along the entire length of the bone.

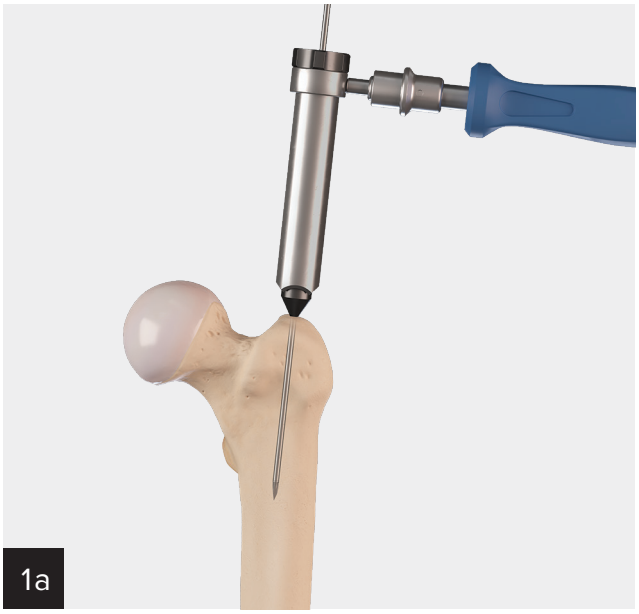
If reconstruction screws are planned, the C-arm must allow for lateral imaging of the femoral head and neck. Adduction of the femur can be helpful when locating the appropriate entrance point. Drape the patient appropriately to allow the surgeon to work from the hip to just below the knee.

Entry Point

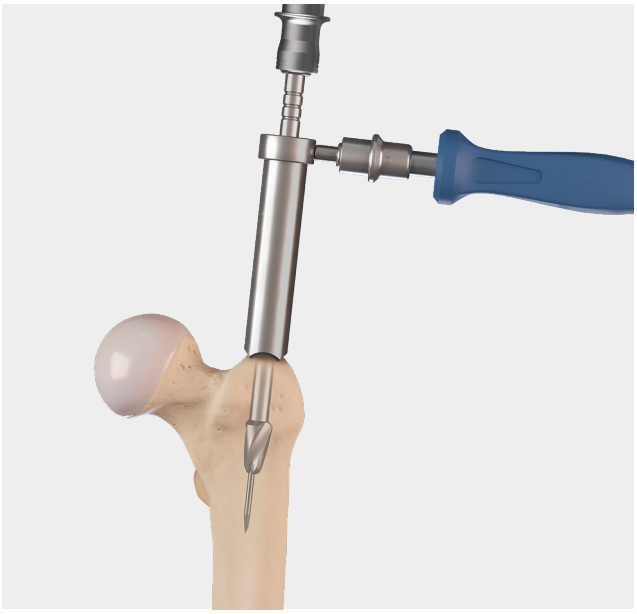
The entry point for the nail is located on the greater trochanter. On the AP image, the starting point should be on the tip of the greater trochanter. On the lateral image, the starting point should be near the junction of the anterior and middle third of the greater trochanter.



Entry Option 1



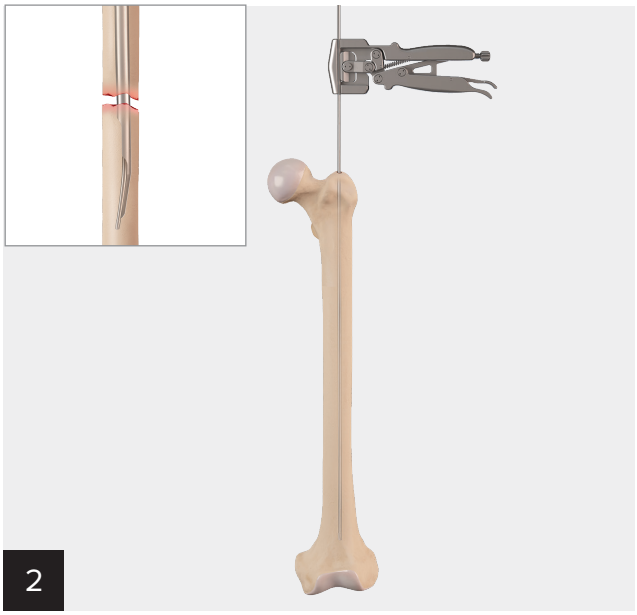
Place the 3.2 mm pin guide and soft-tissue protector through the incision. Align the soft-tissue protector in line with the femoral shaft on the AP and lateral image views.



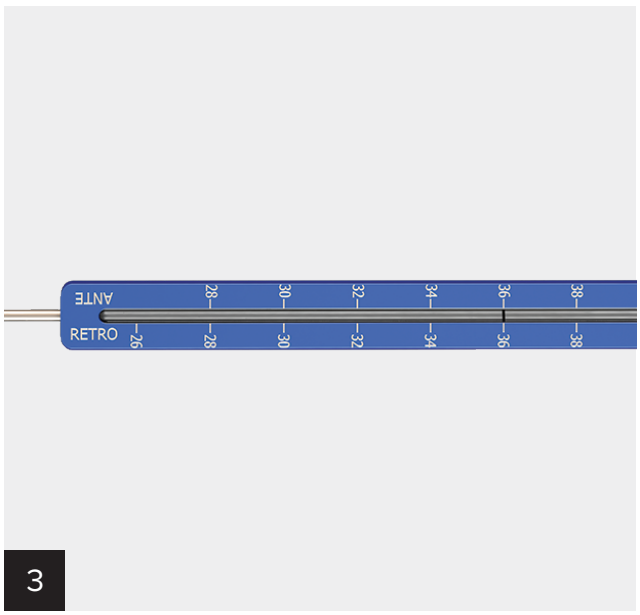
Place the 13.5 mm cannulated entry reamer over the guide pin and ream the proximal fragment of the femur through the soft-tissue protector.

Entry Option 2

Alternatively, the surgeon may open the greater trochanter with a cannulated curved awl followed by a 3 mm ball nose guidewire that is placed through the curved awl to the desired depth. The 13.5 mm entry reamer should be used over the ball nose after insertion.



Use the guidewire gripper to advance the 3 mm ball nose guidewire to the level of the fracture. Alternatively, a curved reduction tool can be used to assist in fracture reduction. The 3 mm ball nose wire can be inserted through the curved reduction tool and into the distal fragment.



The proper nail length is determined by sliding the guidewire depth gauge over the ball nose guidewire to the greater trochanter and reading the appropriate length from the calibrated line on the guidewire.

After obtaining the proper nail length, begin reaming with the 8 mm end-cutting reamer. Sequentially ream until cortical chatter is achieved. Ream 1 mm to 1.5 mm over the desired nail diameter.

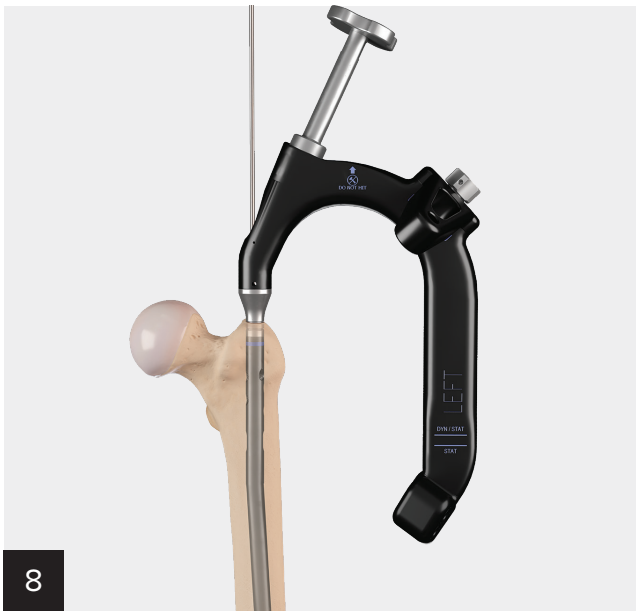
Attach the antegrade radiolucent targeting guide to the appropriately sized nail using the T-handle and ball hex driver. Dependent on surgical side, a left nail is indicated by a blue proximal stripe, while a right nail is indicated by a rose proximal stripe.

6

If using antegrade interlocking screws, the antegrade targeting module should be attached to the main body of the targeter using a locking knob. Depending on surgical side, the white arrow will match up with either a blue or red arrow.

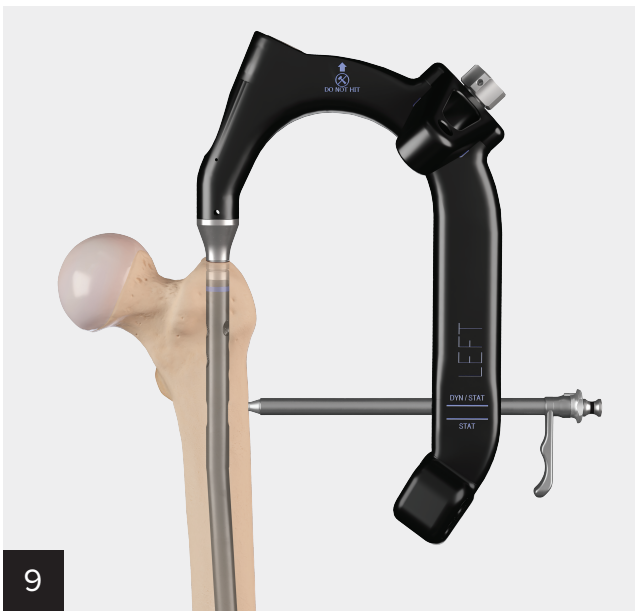
7

Introduce the nail into the proximal femur using the antegrade radiolucent targeting guide. The jig will start anterior and will be rotated laterally as the nail advances down the intramedullary canal.



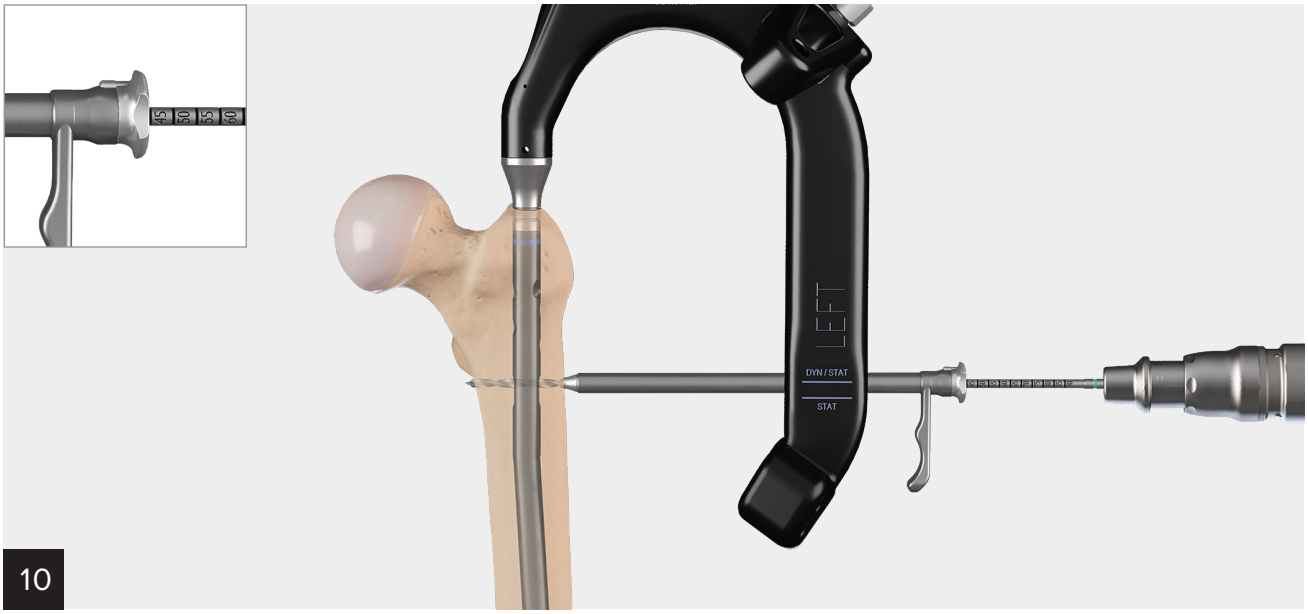
8

If the nail does not enter the femur easily, use a mallet to apply a gentle blow to the impactor pad. It is very important to NEVER HIT directly on the radiolucent targeting guide.

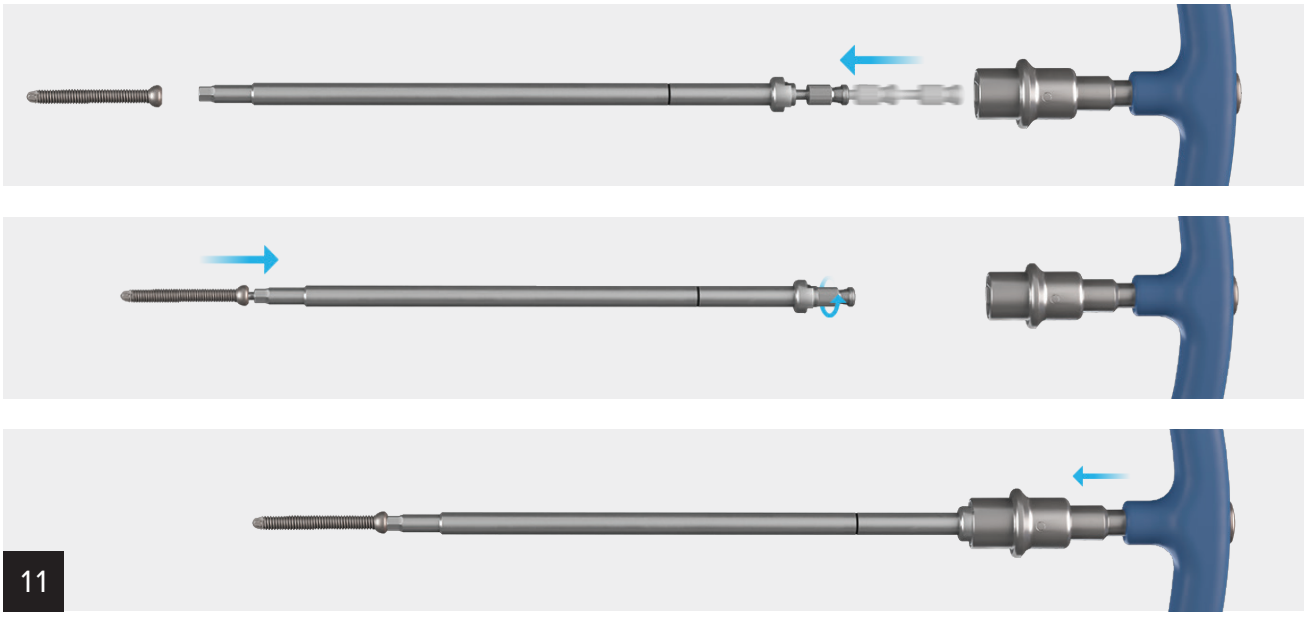


9

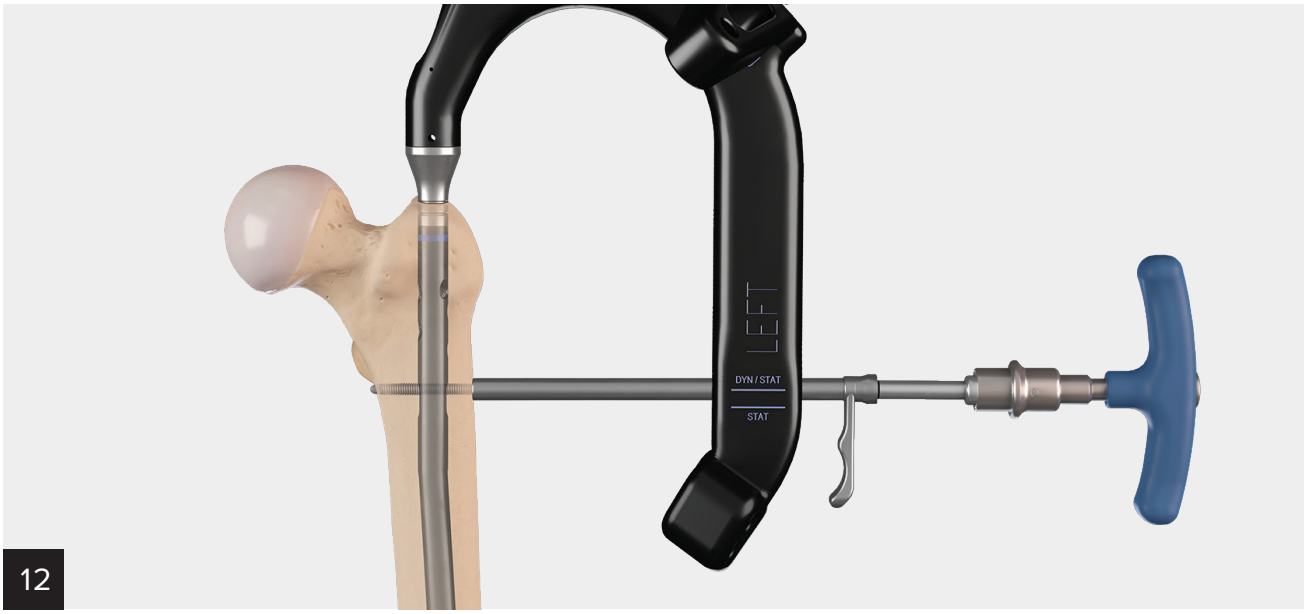
Remove the ball nose guidewire and place the screw sheath, 4 mm drill guide, and 4 mm obturator through the appropriate transverse hole in the targeting guide and mark the skin. Make a small incision and place the sheath, drill guide, and obturator through the incision onto the lateral cortex of the bone.



Remove the obturator and drill the bone using the 4 mm calibrated drill. Measure the screw length from the end of the drill guide using the calibration on the drill.



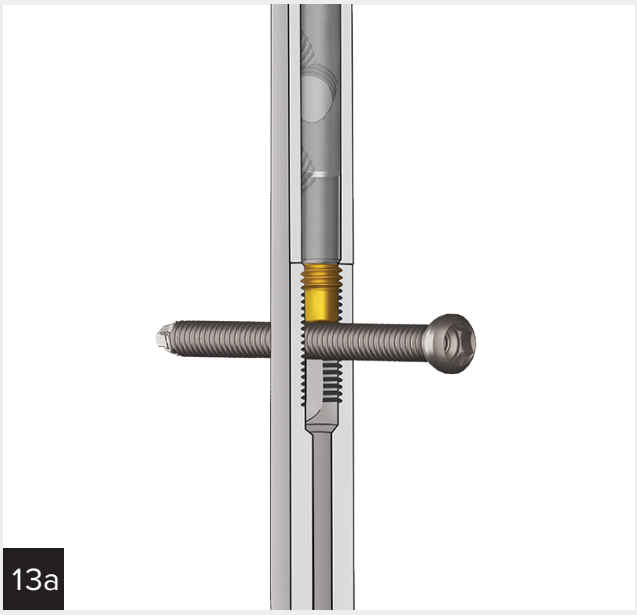
Assemble the 5 mm cortical screw onto the captured hex driver system. The captured hex driver system is assembled by placing the screw onto the 5 mm hex driver then engaging the capturing rod. The captured construct is then connected to the T-handle. This attachment can also be used in a Hudson power adapter should power insertion be desired.



12

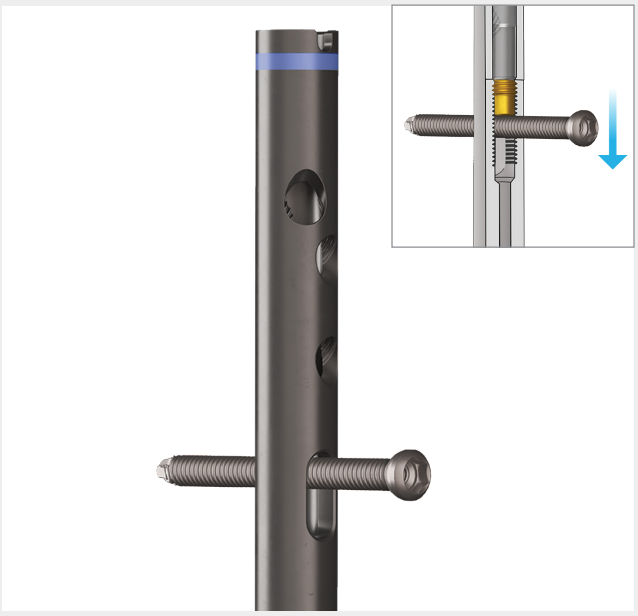
Remove the drill and drill guide and place the screw directly through the sheath using the captured hex driver system. Insert the screw until the black laser etch line is at the level of the screw sheath. Verify screw positioning using fluoroscopy.

Controlled Compression Options



13a

If controlled compression at the fracture is desired, insert the compression spacer so that it rests just above the dynamic slot. Insertion of the compression spacer must occur before the nail is attached to the jig.



Conduct transverse locking within the dynamic slot using the DYN/STAT hole on the targeting guide. Next, perform distal interlocking at the distal aspect of the nail using a freehand technique. Use the 5 mm compression hex driver through the jig into the spacer to compress the inserted cortical screw.

Dynamic Locking
If dynamic locking of the nail is desired with the use of the proximal dynamic slot, conduct transverse locking through the DYN/STAT hole on the targeting guide. The compression spacer is not needed in this instance. Prohibit the dynamic function of the nail.

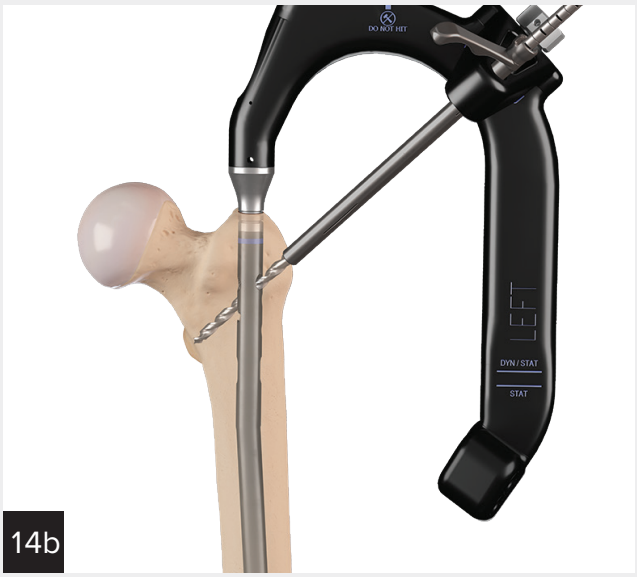
Static Locking With Spacer
If static locking is desired through the proximal aspect of the dynamic slot, insert the compression spacer down to the distal aspect of the dynamic slot.
Note: Insertion of the compression spacer must occur prior to the nail being loaded onto the jig.

Static Locking
If static locking is desired through the distal aspect of the dynamic slot, conduct transverse locking through the STAT hole on the targeting guide. The compression spacer is not needed in this instance.

Proximal Targeting and Interlocking Options

14a

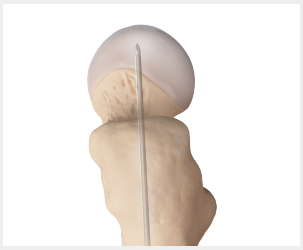
Proximal Targeting (Reconstruction Interlocking)
Insert the screw sheath, the drill guide, and the obturator through the targeting module and mark the incision location on the skin. Make a small incision and insert the sheath, drill, and obturator until it contacts the cortex of the femur. Use a 3.2 mm guide pin or a solid or cannulated 5.5 mm drill bit for proximal femoral screw targeting.



14b

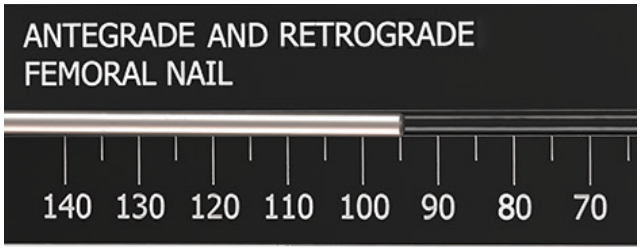
Proximal Targeting (Antegrade Interlocking)
Proximal antegrade interlocking involves the use of a 6.5 mm fully threaded cortical locking screw (PURPLE), 6.5 mm fully threaded cancellous screw (BLUE), or a 6.0 mm partially threaded cancellous screw (YELLOW). Any of these three screws can be used in the antegrade interlocking position.

14c

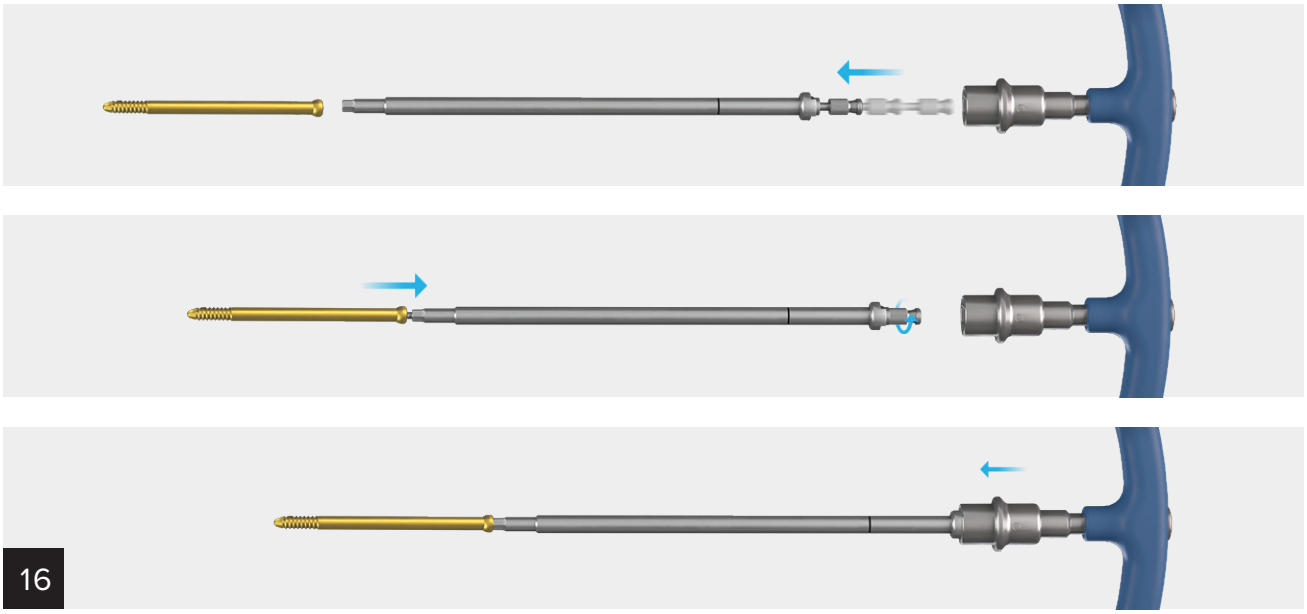


When using a 3.2 mm guide pin, place the pin into the pin guide and insert it into the femoral head. The location of the guide pin should be checked on both AP and lateral views. Take a lateral view of the femoral head to ensure the guide pin has been placed centrally. In both AP and lateral views, the tip of the guide pin should be approximately 5 mm from the subchondral bone.

15



Place the guide pin depth gauge under the 3.2 mm guide pin and against the pin guide. Read the required length from the depth gauge, assuring that the sheath is touching the bone. Insert the 5.5 mm calibrated cannulated drill (BLUE/PURPLE) over the guide pin. Then, drill the femoral head to the appropriate depth, measuring the screw length off of the calibration lines.



16

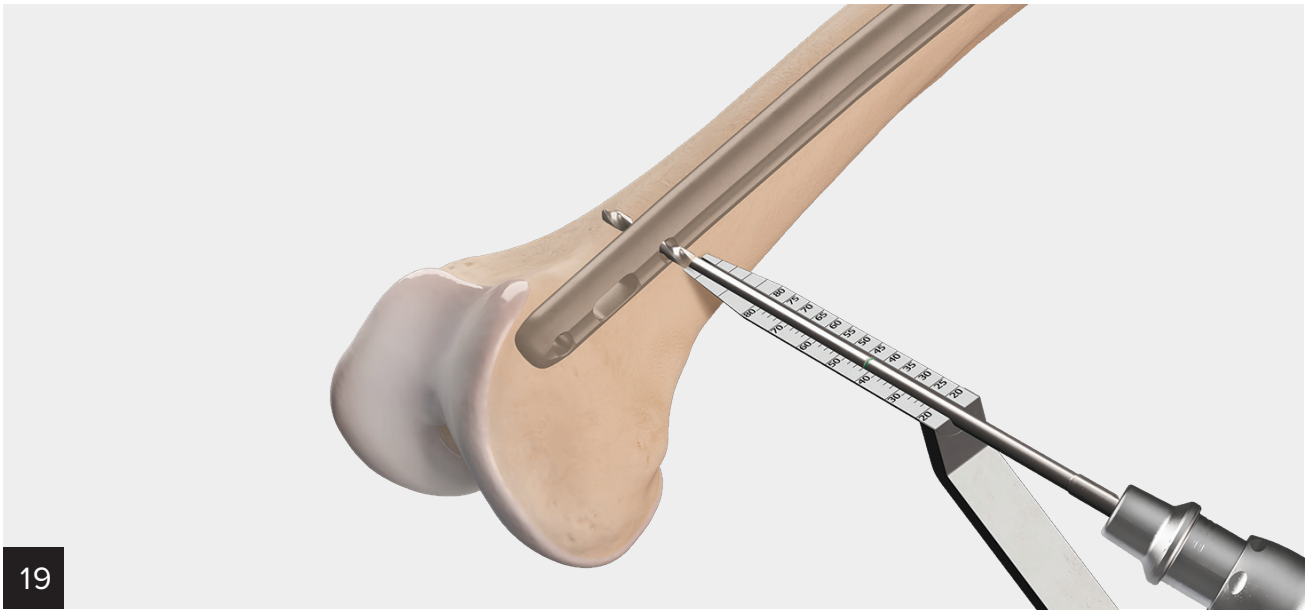
Assemble the appropriate screw onto the captured screw driver system and T-handle. This attachment can also be used in a Hudson power adapter should power insertion be desired.

17

Remove the 3.2 mm guide pin out of the screw sheath and advance the selected screw into the femoral head using the T-handle and 5 mm capturing hex driver. Insert the screw until the black laser etch line is at the level of the screw sheath.

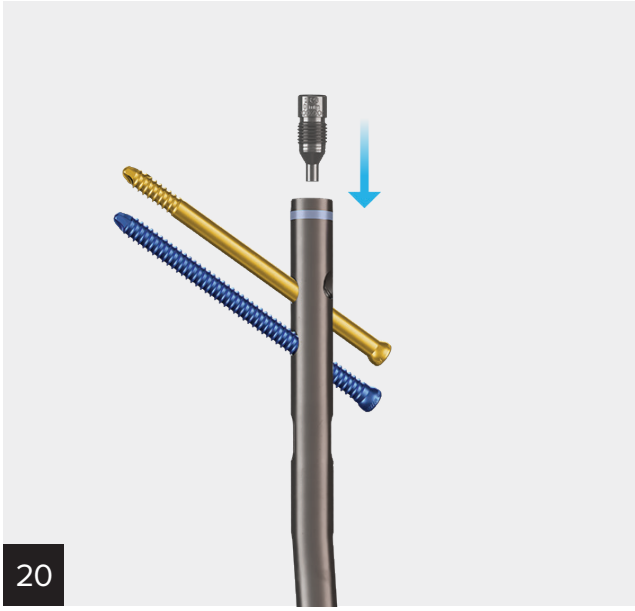
18

Distal locking includes two static holes and a dynamic slot.

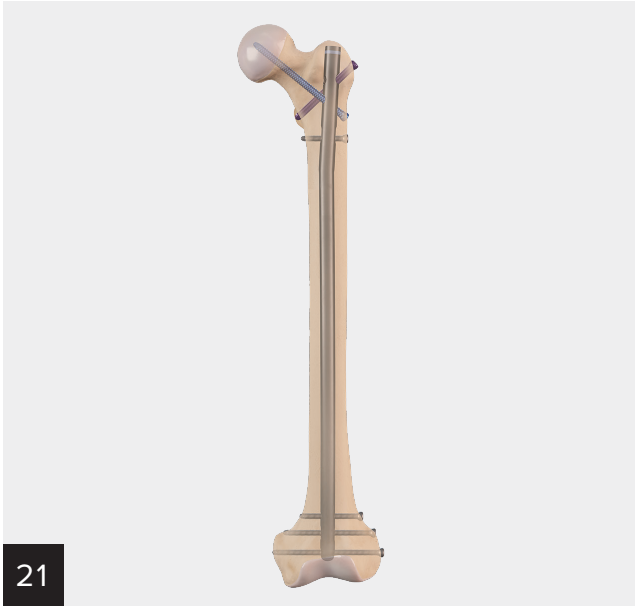


19

Using a perfect circle technique, drill bicortically in the distal femur with a 4 mm drill bit. Fluoroscopy can be used to assist. Screw length can be measured from the green line on the 4 mm drill bit referenced off the distal depth gauge sled. Alternatively, a standard depth gauge can be used.



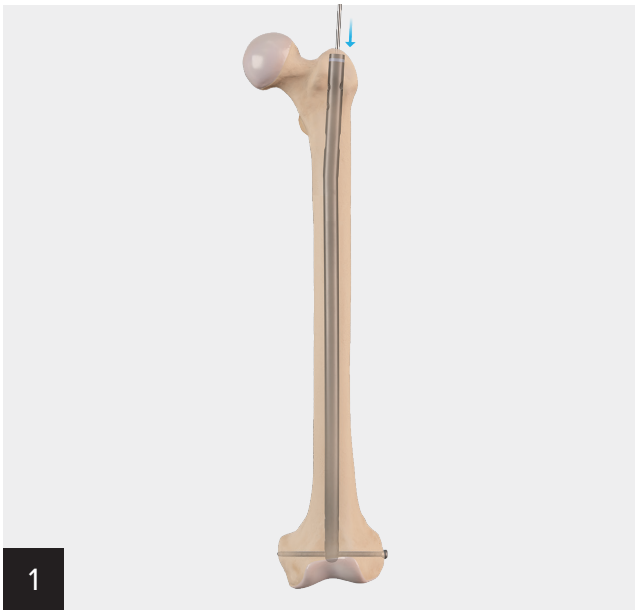
End Cap Insertion (Optional) – If a 6.0 mm partially threaded cancellous screw is used in the most proximal reconstruction locking hole of the nail, a locking end cap may be used to prevent lateral migration of the proximal screw.



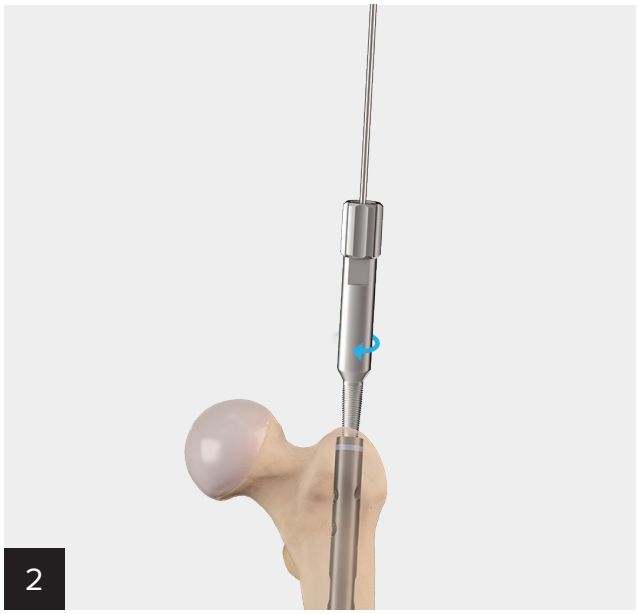
Final fixation.

Antegrade Nail Proximal Locking Options

Nail Removal Technique

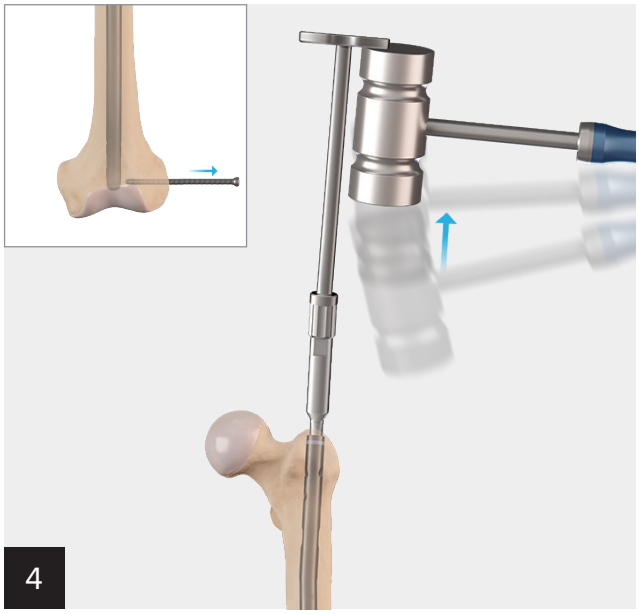


Remove all points of fixation except one. Using fluoroscopy, insert a 3.2 mm guide pin under fluoroscopy into the proximal body of the nail. It is important to leave one point of fixation to control the nail rotation and depth while threading the extraction bolt.



Slide the extraction bolt over the 3.2 mm guidewire and thread it into the proximal portion of the nail.

Remove the 3.2 mm guide pin and thread the hammer pad into the extraction bolt.



Remove the last point of fixation. Using a mallet, back slap the nail out of the canal.

Ordering Information

Arthrex Antegrade Femoral Nailing

Product Description	Item Number
Instruments	
Impactor Rod	**0826-000**
Extractor Bolt	**0828-000**
Impactor Pad, long	**0835-000**
Locking Knob, insertion guide, tibial nail	**1239-100**
Locking Collet, targeting module, tibial nail	**1242-100**
Antegrade Targeting Module, femoral nail	**1271-300**
Antegrade Option, antegrade targeting guide	**1272-000**
Locking Bolt, antegrade nail	**1273-100**
Retrograde Targeting Guide	**1280-000**
Retrograde Targeting Guide, arch	**1281-000**
Retrograde Targeting Guide, 22 cm extension	**1283-000**
Locking Bolt, retrograde femoral nail	**1284-000**
Driver Locking Collet, retrograde femoral nail	**1285-000**
Femoral Nail Instrument Set #2	**9924-000**
Awl T-Handle, silicone blue, cannulated, curved	**0256-200**
Entry Reamer, femoral nail, cannulated, 13.5 mm	**0266-000**
Tap, calibrated, cancellous, 6.0 mm	**0271-000**
Cortical Tap, calibrated, cortical, 6.5 mm	**0272-000**
Obturator, 3.6 mm	**0273-000**
Pin Guide, 3.2 mm	**0335-000**
Pin Guide, soft tissue protector, 3.2 mm	**0338-000**
Drill Guide, 4.0 mm	**0337-000**
Drill Guide, 6.0 mm	**0339-000**
Screw Driver Handle, cannulated, silicone, Hudson	**0467-000**
T-Handle, cannulated, Hudson female/J-Hall connect	**0468-000**
Quick Connect, cannulated, Hudson female/J-Hall	**0469-000**
Driver, ball hex, large Hudson, 9/32"	**0474-000**
Guidewire Gripper	**0481-100**
Compression Hex Driver, Hudson, antegrade, 5.0 mm	**0487-000**
Power Hex Screw Driver, 5.0 mm	**0488-200**
Power Capturing Rod, 5.0 mm	**0489-100**
Power Hex Screw Driver, short, 5.0 mm	**0491-100**
Power Capturing Rod, short, 5.0 mm	**0492-100**
Distal Depth Gauge	**0514-200**

Product Description	Item Number
Depth Gauge, hook tip, trochanteric nail	**0531-000**
Guide Pin Depth Gauge, femoral nail	**0534-000**
Guidewire Depth Gauge, femoral nail	**0535-000**
Drill Guide, obturator, 4.0 mm	**0622-000**
Screw Sheath	**0624-000**
Obturator, 3.2 mm	**0625-000**
Soft-Tissue Protector, Hudson quick connector	**0634-100**
Obturator, 6.0 mm	**0635-000**
Ball Spike	**0817-000**
Reduction Tool, curved	**0831-000**
Square Quick Connect Assembly	**0834-000**
Femoral Nail Instrument Set #1	**9922-000**
Antegrade Femoral Nails, left	
Antegrade Femoral Nail, left, 9 mm × 30 cm–46 cm	**1308-030-046**
Antegrade Femoral Nail, left, 10 mm × 30 cm–46 cm	**1310-030-046**
Antegrade Femoral Nail, left, 11 mm × 30 cm–46 cm	**1312-030-046**
Antegrade Femoral Nail, left, 12 mm × 30 cm–46 cm	**1314-030-046**
Antegrade Femoral Nail, left, 13 mm × 30 cm–46 cm	**1316-030-046**
Antegrade Femoral Nail, left, 14 mm × 30 cm–46 cm	**1318-030-046**
Antegrade Femoral Nails, right	
Antegrade Femoral Nail, right, 9 mm × 30 cm–46 cm	**1309-030-046**
Antegrade Femoral Nail, right, 10 mm × 30 cm–46 cm	**1311-030-046**
Antegrade Femoral Nail, right, 11 mm × 30 cm–46 cm	**1313-030-046**
Antegrade Femoral Nail, right, 12 mm × 30 cm–46 cm	**1315-030-046**
Antegrade Femoral Nail, right, 13 mm × 30 cm–46 cm	**1317-030-046**
Antegrade Femoral Nail, right, 14 mm × 30 cm–46 cm	**1319-030-046**

Product Description	Item Number
Implants	
End Cap, antegrade nail, 5 mm	**1322-005**
End Cap, antegrade nail, 10 mm	**1322-010**
Locking End Cap, recon lock, antegrade nail, 0 mm	**1323-000**
End Cap, antegrade nail, 0 mm	**1324-000**
Screw Spacer/Compression Bolt, femoral nails	**1326-000**
Captured Screws	
5.0 mm Cortical Lengths: 30 mm–50 mm (2 mm increments)	**8001-030-50**
5.0 mm Cortical Lengths: 55 mm–100 mm (5 mm increments)	**8001-055-100**
6.5 mm Cortical, fully threaded Lengths: 30 mm–120 mm (5 mm increments)	**8059-030-120**
6.0 mm Cancellous, partially threaded Lengths: 30 mm–120 mm (5 mm increments)	**8061-030-120**
6.5 mm Cancellous, fully threaded Lengths: 30 mm–120 mm (5 mm increments)	**8065-030-120**

Product Description	Item Number
Disposables	
Drill, large Hudson, cannulated, 5.5 mm	**0232-100**
Drill, AO, 4.0 mm × 165 mm	**S0210-200**
Drill, AO, calibrated, 4.0 mm × 280 mm	**S0219-100**
Drill, AO, calibrated, sterile, 5.5 mm	**S0288-200**
Step Drill, AO, calibrated, sterile, 4.8 mm/6.0 mm	**S0289-100**
Guide Pin, 3.2 mm × 330 mm	**S0100-000**
Tap, large Hudson, cortical, 5.0 mm	**S0260-000**

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

arthrex.com