Bi-compartmental Knee Arthroplasty:

Combination of Gender Solutions® Patello-Femoral Joint (PFJ) System & Persona® Partial Knee

Surgical Technique

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Introduction

There is evidence that suggests that combining a medial unicondylar knee replacement with a patello-femoral joint replacement, in the presence of appropriate patient selection for this procedure, gives patients better functional outcomes than a traditional total knee replacement.[1–7]

The Persona Partial Knee spacer block technique method should be used while implanting the partial knee replacement in bi-compartmental arthroplasty, as an intramedullary rod is not needed.

There are two types of bi-compartmental knee arthroplasty: simultaneous and staged.

Simultaneous Bi-compartmental Knee Arthroplasty

This technique will give detailed instructions on how to perform both a medial unicondylar knee replacement and a patello-femoral joint replacement in one surgical setting.

Staged Bi-compartmental Knee Arthroplasty

When doing bi-compartmental arthroplasty in separate surgical settings, for example, a patello-femoral joint replacement is well-fixed, but there is progression of disease and a need for a medial unicondylar knee replacement, some of these same instructions in this technique also apply.

The other scenario is a well-fixed medial unicondylar knee replacement, but there is progression of disease to the patello-femoral joint, so patello-femoral arthroplasty is performed in addition to the existing medial unicondylar knee replacement rather than revising to a total knee replacement.

The Gender Solutions® Patello-Femoral Joint (PFJ) is cleared for use with the Persona® Partial Knee System in the United States and European Union.[8]

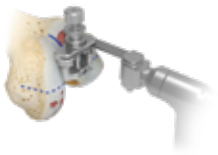
Procedure Overview

Chapter 1: Incision and Resect Patella

Step 1: Make incision

Step 2: Resect patella

Chapter 2: Gender Solutions PFJ



Step 3: Anterior Femoral Cut

Step 4: Mill Trochlea

Step 5: Drill Peg Holes

Step 6: Trial PFJ

Chapter 3: Persona Partial Knee

Step 7: Proximal Tibia Cut

Step 8: Distal Femoral Cut

Step 9: Check Gaps

Step 10:Femoral Preparation

Step 11: Tibial Sizing

Step 12: Tibial Preparation

Step 13: Trial both Persona Partial and PFJ

Chapter 4: Cementing

Step 14: Cement Persona Partial

Step 15: Cement PFJ

Chapter 1
Incision and Resect Patella

Figure 1

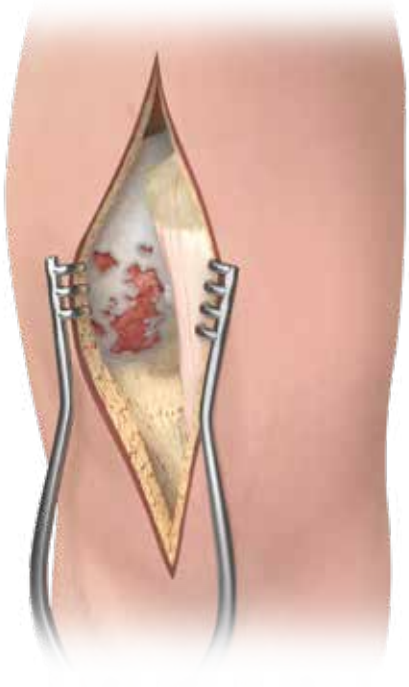


Figure 2

Positioning the Limb

Once the patient is prepped and draped on the operating table, in a supine position, the knee and ipsilateral hip should be freely mobile (Figure 1).

Incision

The incision can be made with the leg in flexion or extension. The incision must allow for good exposure. Make a straight skin incision from the medial margin of the patella to a point approximately 3 cm distal to the joint line (Figure 2); a good ratio is usually an incision that is ⅔ above and ⅓ below the joint line. Deepen the incision through the subcutaneous tissues to the joint capsule. The deep exposure can be medial parapatellar, midvastus or subvastus depending on the surgeon's preference and experience. The deep arthrotomy should pass around the patella and along the medial side of the patellar tendon.

Expose the front of the tibia in the lower part of the wound from the tibial tubercle to the antero-medial rim of the plateau. Excise as much of the medial meniscus as possible. Do not 'release' any of the fibers of the medial collateral ligament.

Excise part of the retropatellar fat pad and insert retractors to expose the medial compartment and intercondylar notch; the lateral and patellofemoral compartments should also be inspected prior to proceeding. Insufficiency of the collateral, anterior or posterior cruciate ligaments, which would preclude stability of the device, is a contraindication. If this is found, the operation should be abandoned in favor of a total knee replacement.

Figure 3

Figure 5

Standard Implant Patella Size & Thickness

26 mm x 7.5 mm*	35 mm x 9.0 mm
29 mm x 8.0 mm	38 mm x 9.5 mm
32 mm x 8.5 mm	41 mm x 10.0 mm

* **The 26 mm patella must always be inset.**

See package insert for complete details.

Figure 4

Figure 6

Prepare the Patella

If the surgeon determines that the condition of the patient's patella is satisfactory, it is not necessary to resurface the patella.

Resecting the patella can be done at the beginning of the procedure or at the end of the Persona Partial Knee technique. Preparing the patella at the beginning of the technique makes retraction easier without eversion of the patella since there is less patellar thickness. Preparing the patella at the end of the technique better protects the patella.

Technique Tip: These instruments are designed for onlaying all-poly patella only.

Place the leg in full extension, evert the patella to at least 90 degrees. Stabilize the patella, using two inverted towel clips. Incise the soft tissue around the patella down to the insertion of the quadriceps and patellar tendons. Before making any bone cuts, determine the maximum thickness of the patella by using the femur caliper to measure the most prominent anterior-to-posterior dimension (Figure 3).

Technique Tip: The femur caliper has a tolerance of ± 0.25 mm.

Resect the Patella

Please refer to the appropriate surgical technique if other patella instrumentation is to be used to resect the patella.

Refer to the sizing chart for patella dimensions (Figure 4). Use a 3.2 mm drill to drill the highest portion of the medial facet perpendicular to the articular surface approximately 12 mm deep centered on the medial sagittal ridge (Figure 5). This acts as a guide for proper medialization of the patella.

Use the patella osteotomy guide with the stylus set for the desired amount of resection. Depress the button on the stylus while twisting to set the stylus at the desired resection level (Figure 6). If the patella is very worn, resect less bone.

Technique Tip: Assure that the patella osteotomy guide stylus is referencing the most prominent point on the patella before resecting.

Technique Tip: At least 10 mm of bone must remain to ensure that the pegs of the patella implant do not protrude through the anterior surface.

Figure 7

Figure 8

Figure 9

Apply the patella osteotomy guide medially and laterally with the jaws at the osteochondral juncture with the handles of the jig oriented toward the foot. Apply the guide with the jaws parallel to the dorsal surface of the patella, while positioning the patella osteotomy guide stylus over the most prominent point on the patella. Make the resection with a 1.27 mm (0.050 inch) thick saw blade (Figure 7). Cut the patella flat so that a smooth surface remains.

- **Technique Tip:** To facilitate unlocking the patella osteotomy guide from the patella, apply slight gripping pressure on the handles of the patella osteotomy guide and depress the release lever to unlock the patella osteotomy guide (Figure 8).

Finish the Patella

Using the NexGen® Patella Sizing Template, select the maximum-sized patella that does not overhang, centered over the 3.2 mm drill hole as a reference for proper medialization (Figure 9).

- **Technique Tip:** Do not drill through the center hole of the NexGen Patella Sizing Template.
- **Technique Tip:** Eccentric placement of the patella 3–4 mm medially allows for better patella tracking.

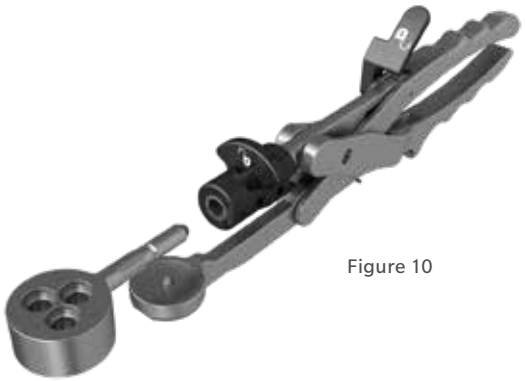


Figure 10

Figure 11

Figure 12

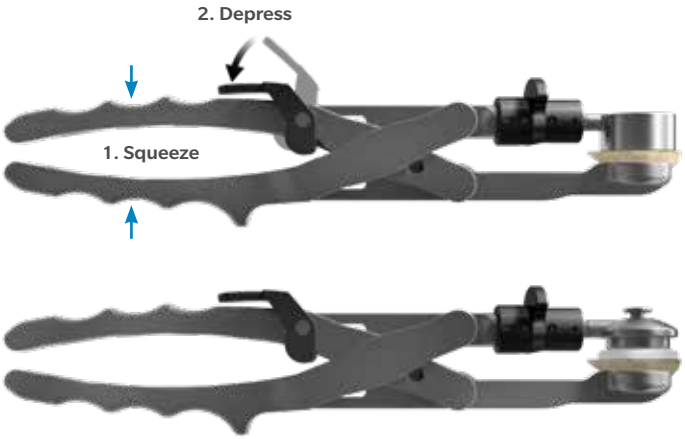


Figure 13

Finish the Patella (cont.)

Insert the appropriately-sized NexGen Patella Peg Drill Guide into the patella clamp in the proper orientation (Figure 10). Place the patella clamp with the NexGen Patella Peg Drill Guide over the cut surface of the patella, centered slightly toward the medial facet over the 3.2 mm drill hole with the clamp oriented so two of the holes are biased toward the medial side of the patella (Figure 11).

Technique Tip: For hard/sclerotic bone it may be necessary to impact the NexGen Patella Peg Drill Guide face to fully seat the drill guide. This is necessary to assure that adequate bone removal is attained during drilling to fully seat the implant.

Use the NexGen 6.4 mm Patella/Femoral Drill to drill through the 3-peg holes in the NexGen Patella Peg Drill Guide (Figure 12).

Technique Tip: To facilitate unlocking the patella clamp from the patella, apply slight gripping pressure on the handles of the patella clamp and depress the release lever to unlock the patella clamp (Figure 13).

Chapter 2
Gender Solutions PFJ

Figure 14

Figure 15

Mark Femoral Landmarks

After preparing the patella, mark the A/P axis (Whiteside's line) from the lowest part of the trochlea to the highest part of the intercondylar notch (Figure 14). With a skin marker, mark a line perpendicular to the A/P axis (Figure 15).

Technique Tip: Alternatively, the transepicondylar axis may be used as reference.

Note: These marks will serve as references in setting external rotation in subsequent steps.

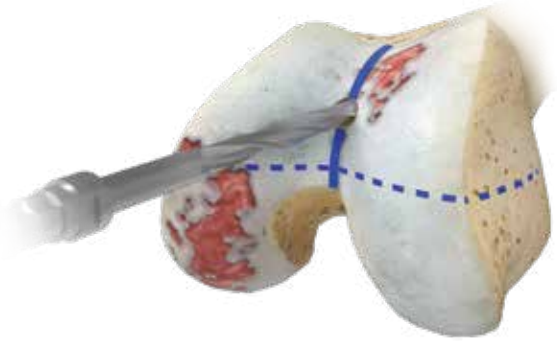


Figure 16

Figure 17

Femoral Anterior Cut

Drilling the IM Hole

Use the 6 mm Intramedullary (IM) drill to drill the hole (Figure 16).

Note: Hole location is 10 mm anterior to the origin of the posterior cruciate ligament.

Assembling the Telescoping Boom to the IM Anterior Cut Guide

The Telescoping Boom is two separate pieces that are connected by tightening the locking knob. If the locking knob is completely locked, it must be loosened and unlocked (Figure 17) in order to connect the Telescoping Boom to the IM Anterior Cut Guide.

Figure 18

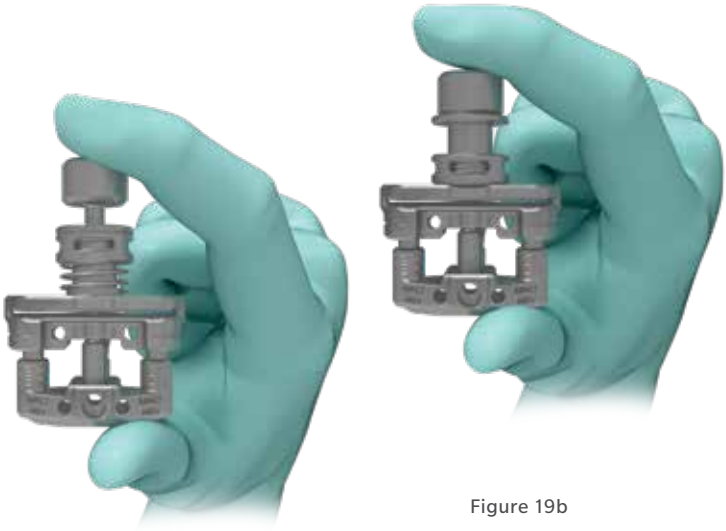


Figure 19a

Figure 19b

Assembling the Telescoping Boom to the IM Anterior Cut Guide (cont.)

The IM Anterior Cut Guide has a fixed IM rod attached. The IM rod can be moved from side-to-side in the M/L plane (Figure 18).

Push down and hold adjustment knob on the IM Anterior Cut Guide (Figure 19a, 19b) while sliding the Telescoping Boom onto the IM guide collar (Figure 20). Boom may be inserted from either medial or lateral side.

Release the IM guide adjustment knob.

Lock the Telescoping Boom by tightening the locking knob on the boom.

Technique Tip: It may be necessary to slightly rotate adjustment knob on IM guide while depressing to allow boom insertion.

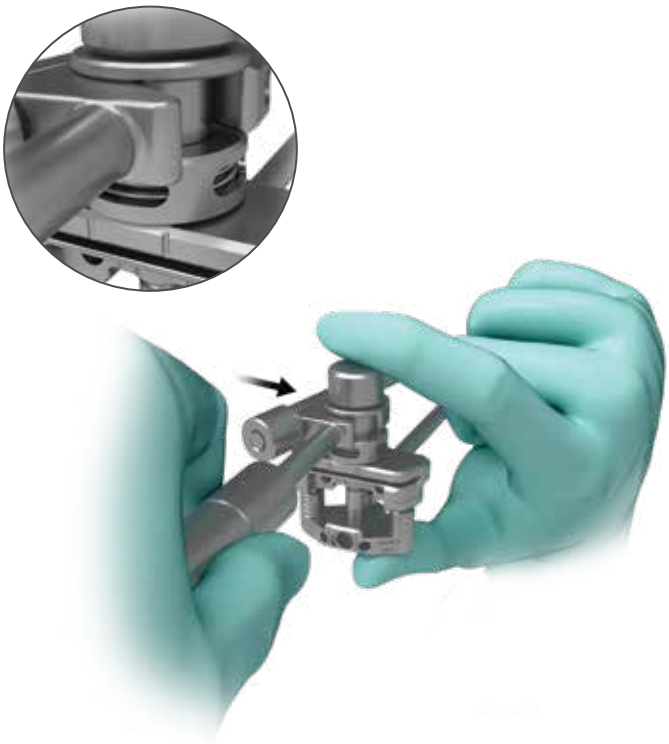


Figure 20

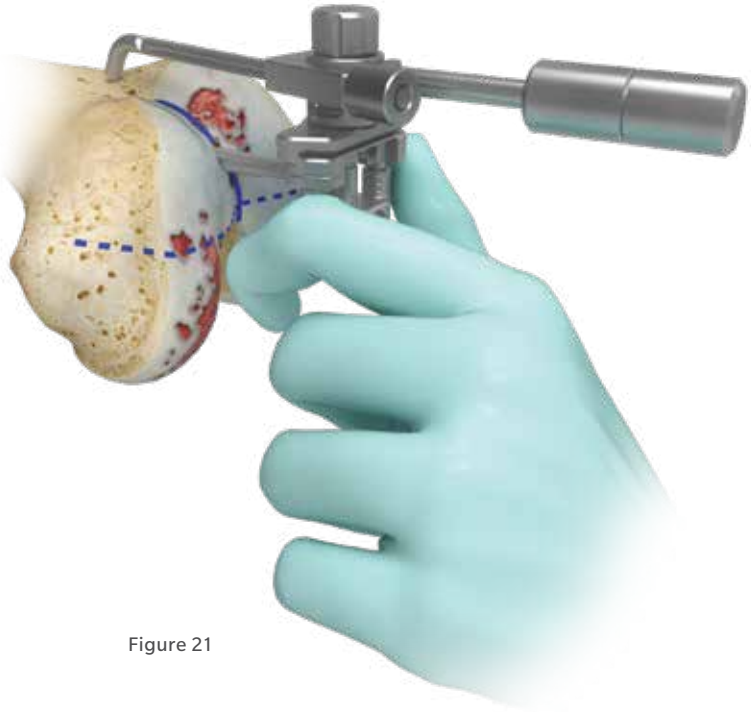


Figure 21

Femoral Anterior Cut (cont.)

Inserting the IM Anterior Cut Guide With Telescoping Boom

Insert the IM Guide into the medullary canal until the proximal aspect of the guide slightly contacts the distal femoral sulcus. The guide may be inserted by hand (Figure 21) or with the Inserter/Extractor Handle (Figure 22).

Figure 22

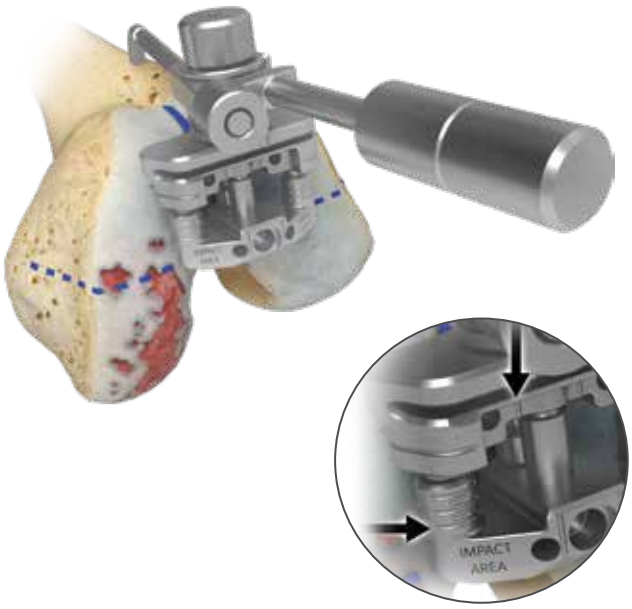


Figure 23

Setting External Rotation and Depth for Anterior Cut

If impaction is required, impact using the Inserter/Extractor Handle or impact directly on the IM Anterior Cut Guide only at the location marked "IMPACT AREA".

Note: Impacting the proximal aspect of the IM Anterior Cut Guide could cause instrument damage and should be avoided.

Technique Tip: To provide additional clearance for the Telescoping Boom to clear the anterior femur during insertion, adjust the IM guide to the "open" position (turning adjustment knob on top of IM guide counter-clockwise).

Caution: Avoid over-impacting the guide to prevent damage to the condyles.

Rotate the IM guide to the desired external rotation.

To align to the A/P axis, rotate the IM guide until the vertical reference lines on the guide are parallel with the A/P axis.

If using transepicondylar axis or line perpendicular to the A/P axis, rotate until the horizontal lines on the guide are parallel to the marked lines (Figure 23).

Technique Tip: Moving the knee closer to extension will improve visibility of the anterior femur.

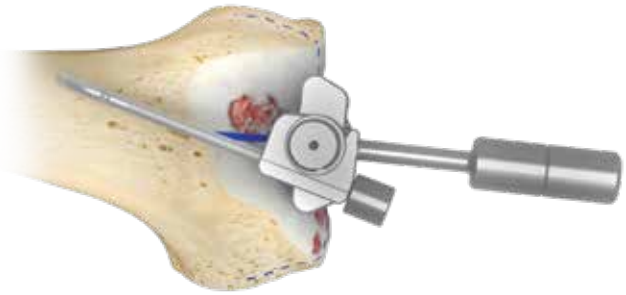


Figure 24

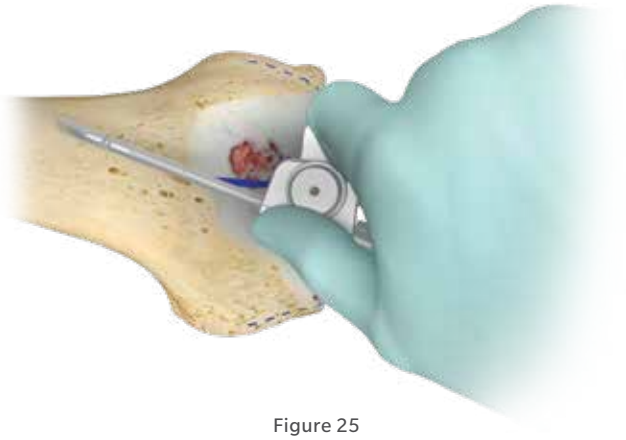


Figure 25

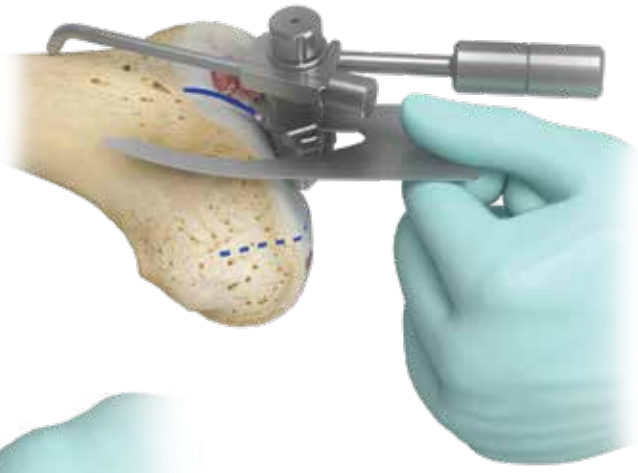


Figure 26

Femoral Anterior Cut (cont.)

Setting External Rotation and Depth for Anterior Cut (cont.)

Extend the knee and move the Telescoping Boom tip onto the lateral facet of anterior cortex (to help avoid notching) (Figure 24).

The goal is to create a flush cut with the anterior cortex.

Adjust A/P height of the cut guide by turning the IM guide adjustment knob until the boom tip just contacts the cortex (Figure 25).

Note: Avoid excessive pressure on the boom tip.

Confirm anterior cut with the Resection Guide (Figure 26).

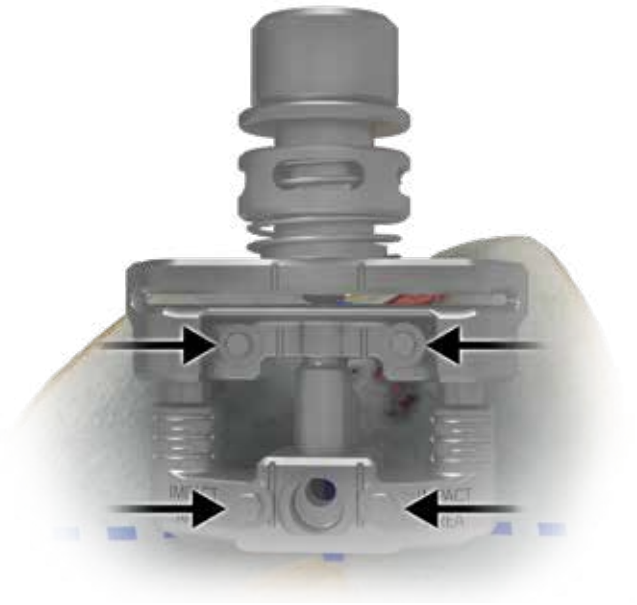


Figure 27

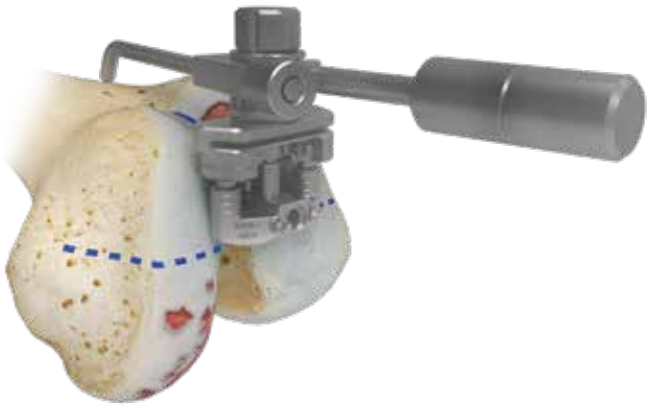


Figure 28

Securing the Guide and Making the Anterior Cut

Secure the cut guide to the femur with three or four 33 mm MIS Quad-Sparing™ Headed Screws.

Sequentially tighten the screws (at least one of the screws must be inserted in an anterior screw hole) (Figure 27).

Technique Tip: To maintain screw purchase and avoid mal-positioning of the guide, do not over-tighten the screws. Overtightening screws will lead to an extension position of the femoral guide and potentially to anterior notching.

It is recommended to recheck the planned resection with the Resection Guide in case movement occurred during screw insertion.

The final position of the guide with the screws is shown in Figure 28.

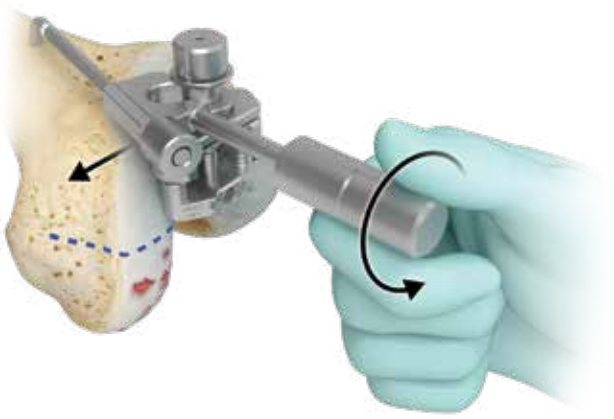


Figure 29

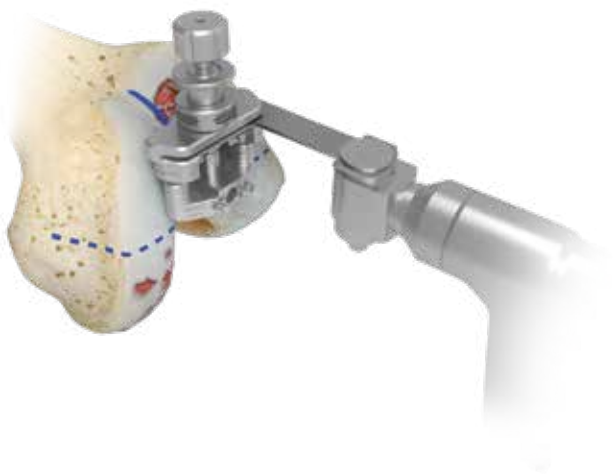


Figure 30

Femoral Anterior Cut (cont.)

Securing the Guide and Making the Anterior Cut (cont.)

Loosen the locking knob on the boom and slide the boom off the IM Anterior Cut Guide (Figure 29).

Remove the Telescoping Boom.

Note: Failure to remove the Telescoping Boom before cutting will result in damage to the IM Anterior Cut Guide.

Make anterior cut with an oscillating saw (Figure 30).

Note: Recommended saw blade is 19 mm (.75 inch) width and 1.27 mm (.050 inch) thick (standard thickness).

Remove the screws from the guide.

Attach the Inserter/Extractor handle to remove IM Anterior Cut Guide from the femur.

Attach the slaphammer to the end of the Inserter/Extractor handle to aid in removal if needed.

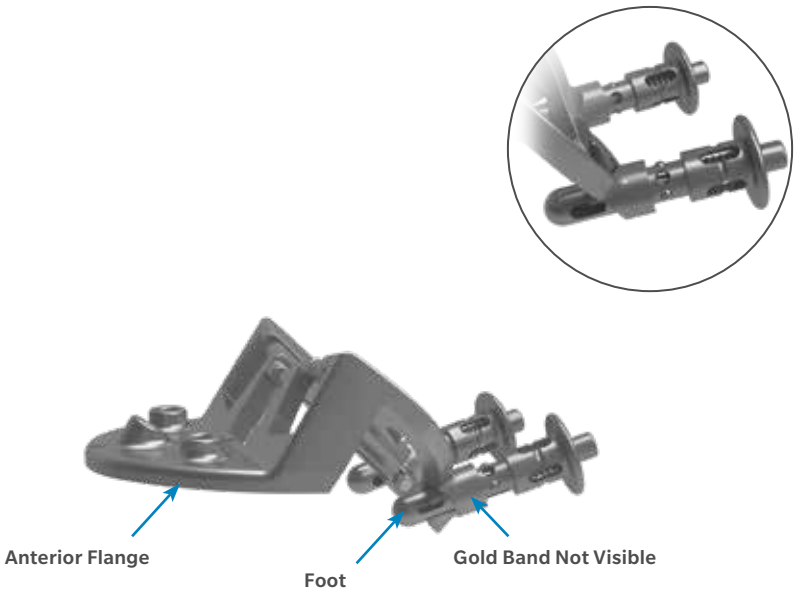


Figure 31

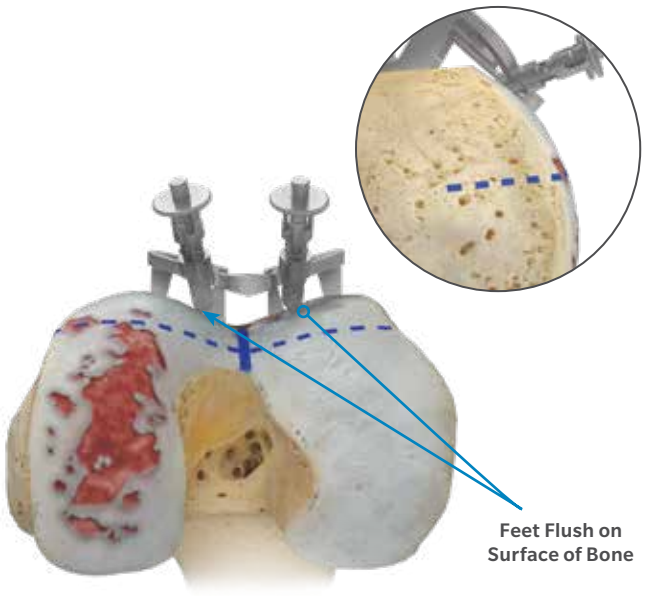


Figure 32

Size Femoral Trochlea

Milling Guide Set-up and Positioning

Before choosing the appropriately-sized Milling Guide, the guides must be set to the correct position. The feet on each Milling Guide must be in the middle or "set" position. To move the feet to the set position, depress and hold the spring-loaded button while pulling up or down on each foot until each foot is in the "set" position (Figure 31).

Tug slightly on the foot without the button depressed to ensure the foot is locked.

When the feet are in the "set" position the gold band will not be visible.

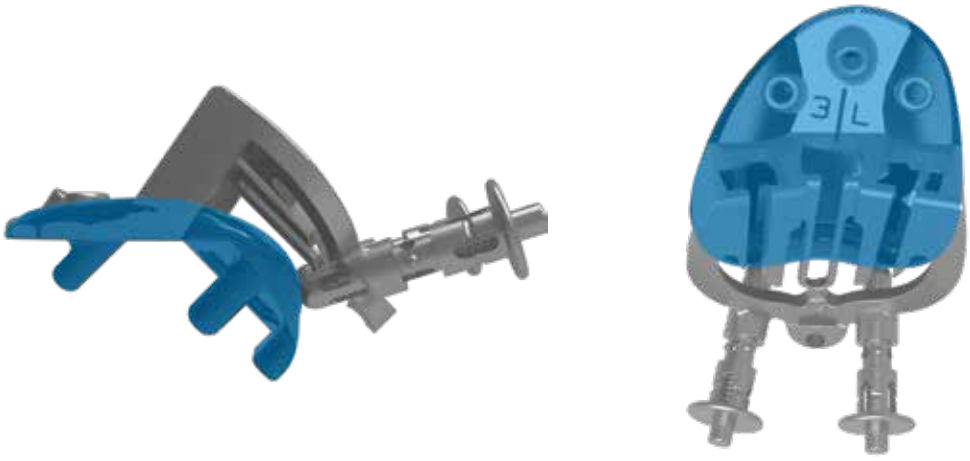


Figure 33

Size Femoral Trochlea (cont.)

Milling Guide Set-up and Positioning (cont.)

Select the appropriate size and side Milling Guide (left or right). Place the guide onto the bone. Ensure the anterior flange and two feet of the guide are simultaneously in contact with femur during this step (Figure 32).

Note: The Milling Guides are designed to match the outside geometry of the implant and therefore serve as sizing guides (Figure 33).

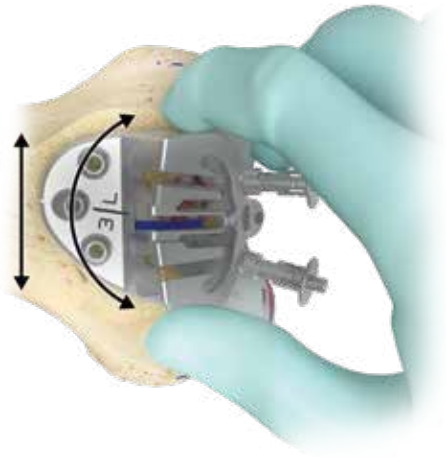


Figure 34

Milling Guide Set-up and Positioning (cont.)

If necessary, reposition Milling Guide both mediolaterally and in varus/valgus until the desired location on the femur is determined (Figure 34).

Caution: Incorrect sizing will result if the feet are not in the "set" position and the anterior flange and feet are not in contact with the femur. See examples of correct and incorrect positioning (Figures 35–37).

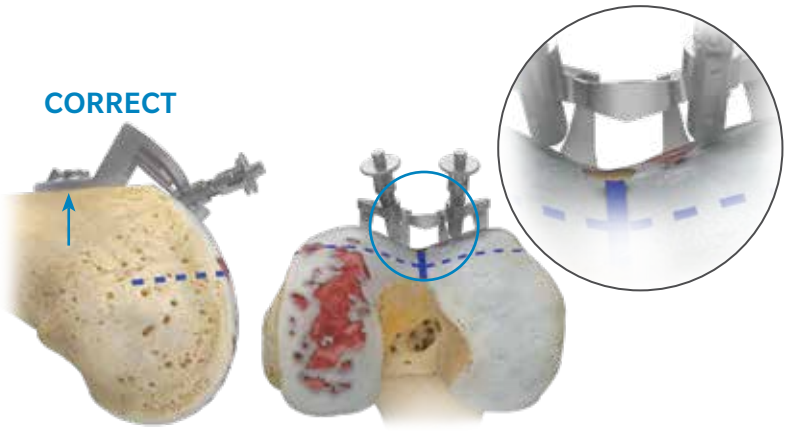


Figure 35a

Figure 35b

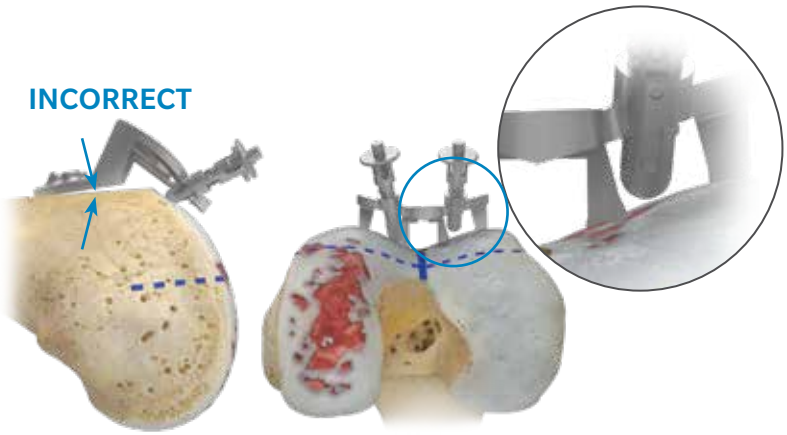


Figure 36a

Figure 36b

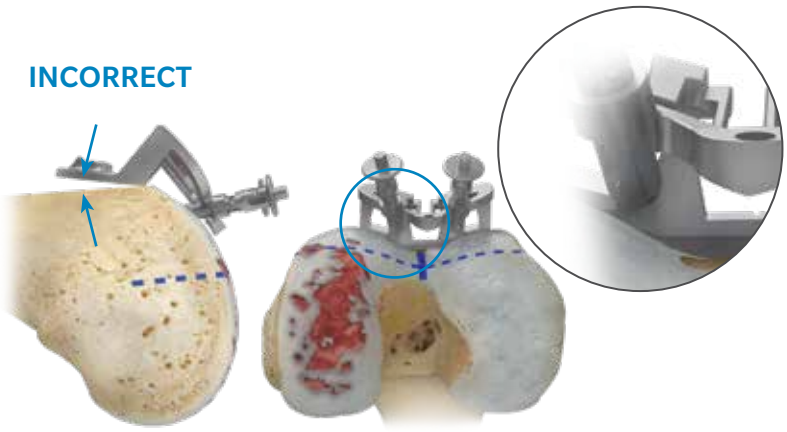


Figure 37a

Figure 37b

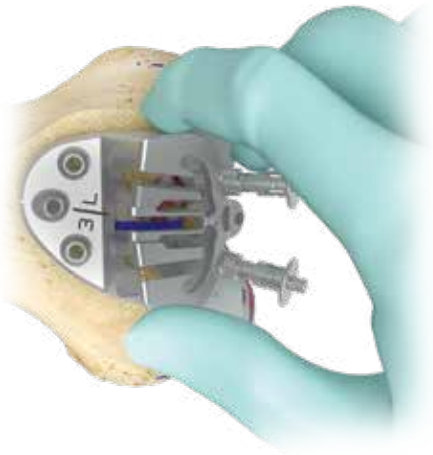


Figure 38

Figure 39

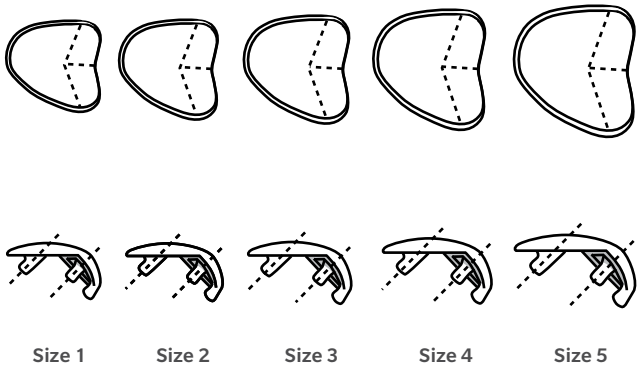


Figure 40

Size Femoral Trochlea (cont.)

Trochlear Component Size Determination

With the Milling Guide positioned properly as described previously, select the trochlear component size by evaluating the following.

Mediolateral Coverage

The anterior flange should cover the anterior cut without overhang. A small amount of underhang/clearance is acceptable (Figure 38).

The engraved line on the Milling Guide and the central milling track represents the location of the patellofemoral track on the implant and may be used as reference (Figure 39).

Note: Mediolateral widths of the implants are in 4 to 5 mm increments (Figure 40).

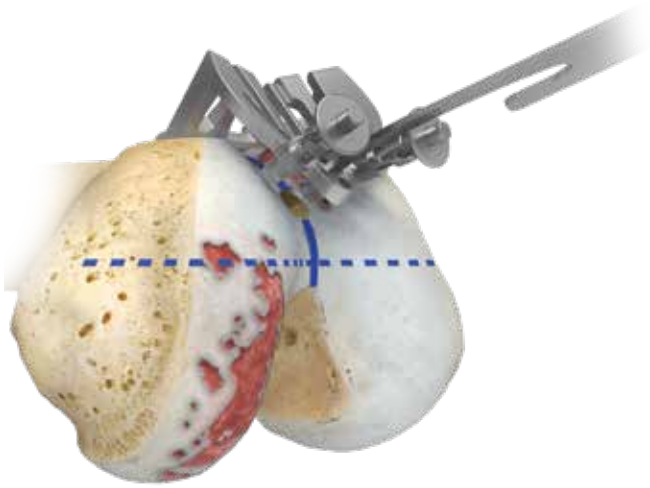


Figure 41

Trochlear Component Size Determination (cont.)

Anterior Bone Coverage

Ensure acceptable proximal coverage.

The anterior flange increases in length with increasing implant size.

Intercondylar Notch Clearance

When choosing between sizes, give priority to trochlear size and not anterior coverage of the bone. Ensure the implant will not overhang into the intercondylar notch.

Approximate the clearance to the notch by inserting the Resection Guide into the tail verification slot of the Milling Guide (Figure 41). The Resection Guide shows the implant's most distal articulating surface ("tail").

If the desired implant size is confirmed, proceed with the next step.

Otherwise, select the next appropriately sized Milling Guide and repeat the above steps until the desired size is chosen.

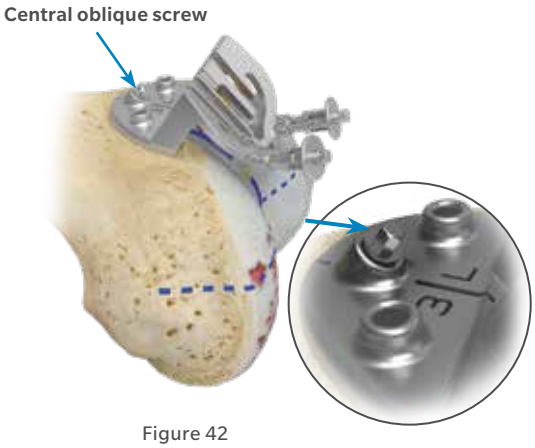


Figure 42

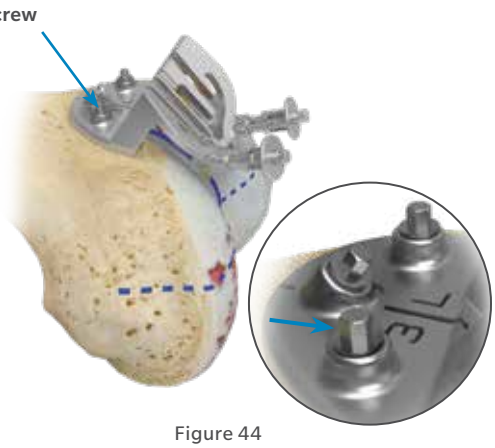


Figure 44

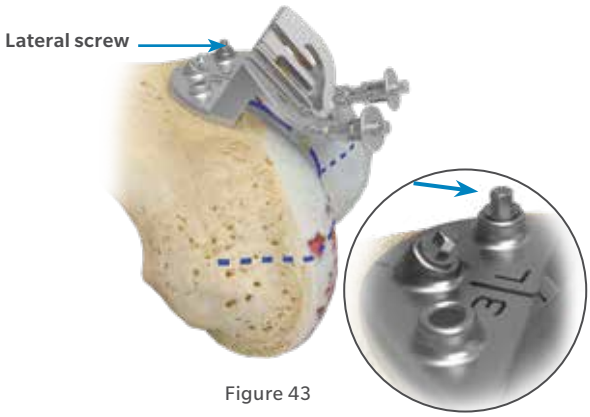


Figure 43

Mill Femoral Trochlea

Secure the Milling Guide

Ensure the Milling Guide anterior flange is flat on the resected anterior bone cut with both feet in contact with the femur.

The feet must be in the "set" position as described on page 18.

Caution: Failure to set both feet in direct contact with the cartilage will result in shallow bone preparation and distalization of the implant, leaving it proud relative to the condylar articular cartilage. This can result in patellar catching and snapping at the transition point. Care should be taken to avoid driving the feet too deep into the cartilage as this would result in proximalization of the implant, leaving it recessed excessively. The intention is to have the trochlear implant flush to 1mm recessed relative to the condylar cartilage. This will be achieved when both feet are just touching the condylar cartilage.

Insert three 33mm MIS Quad-Sparing Headed screws (00-5893-040-33) in the anterior flange of the guide.

Tighten the screws sequentially in the following order:

Central oblique screw (Figure 42)

Lateral screw (Figure 43)

Medial screw (Figure 44)

Use of the 33 mm screws will prevent violation of the posterior cortex.

Technique Tip: To maintain screw purchase and avoid mal-positioning of the guide, do not over-tighten the screws.

Re-verify the Milling Guide feet are touching cartilage and the anterior flange is resting flat on the anterior cut before proceeding.

To reposition (if needed), remove the screws and repeat the above steps.

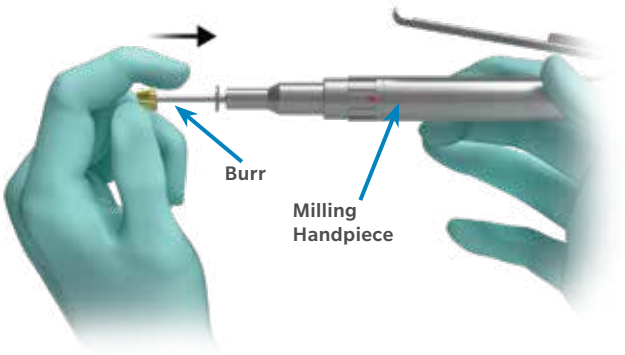


Figure 45

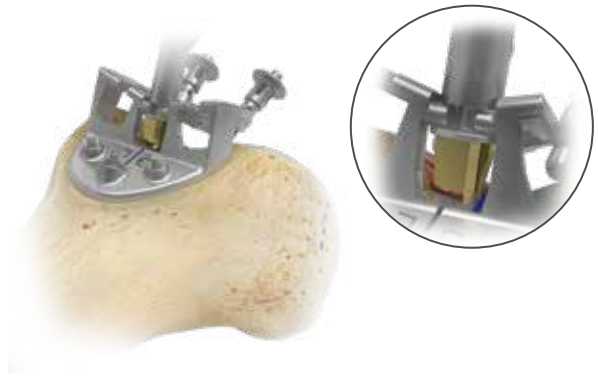


Figure 47

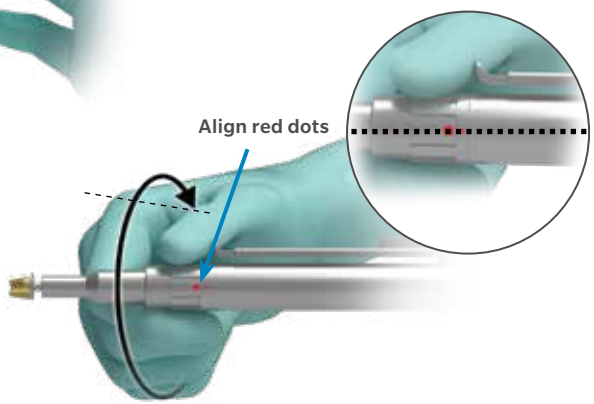


Figure 46

Perform the Milling Operation

Open collet on Milling Handpiece: Unlock the burr locking mechanism by rotating the locking collar into the "open" position (a click can be felt as the collet fully opens).

Install PFJ Mill Burr (00-5927-050-00): Insert burr fully into collet until flush (Figure 45).

Technique Tip: If burr does not sit flush initially, make sure collet is unlocked and rotate burr while inserting.

Lock collet: Rotate the locking collar into the "lock" position (a click can be felt when fully secure, and the "red" dots will be aligned) (Figure 46).

Tug slightly on burr to ensure it is fully locked.

Note: If the Milling Handpiece is inoperable, refer to the Milling Handpiece operating instructions for trouble shooting (packaging insert or brasselerusamedical.com). If after troubleshooting the mill remains inoperable, use a second Milling Handpiece. Refer to Appendix A for the backup milling procedure if a second Milling Handpiece is not available.

When operating the Milling Handpiece, take care to place the slotted end (burr guard) into the track before initiating power on the handpiece (Figure 47).

Warning: The Milling Handpiece should only be operated when engaged in the Milling Guide. Serious injury could occur if instructions are not followed.

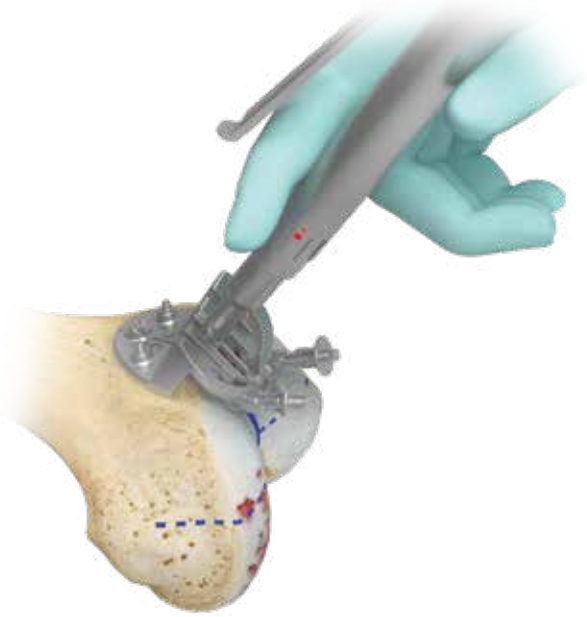


Figure 48

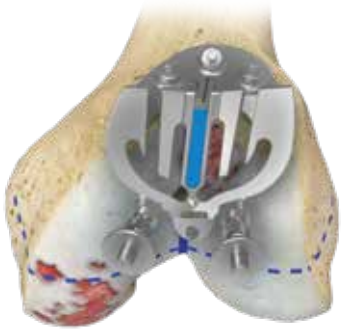


Figure 49

Mill Femoral Trochlea (cont.)

Perform the Milling Operation (cont.)

Guide the Milling Handpiece with a hand on the lower half of the handpiece, similar to holding a pencil (Figure 48). Minimize binding or toggle by keeping the Milling Handpiece perpendicular to the Milling Guide. Hold the hose (you or assistant) to minimize Milling Handpiece toggle. The tracks should be milled in the order described below.

Technique Tip: Run the Milling Handpiece at full throttle. If it stalls at any point, proceed more slowly through the tracks. Irrigation is not necessary with this device, but may be used if desired.

Central track

Apply slight and steady downward pressure while progressing distally along the central track (Figure 49). Be sure to mill the full length to the distal extreme of the central track. After central track milling is complete, disengage the throttle lever prior to exiting the track.

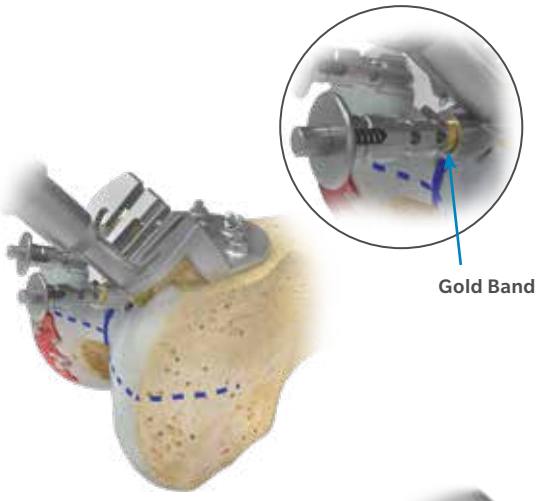


Figure 50

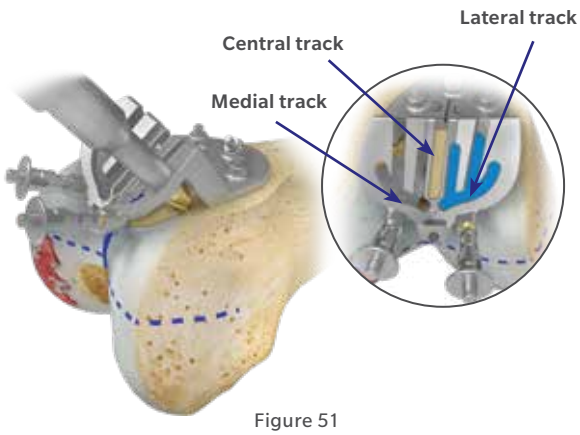


Figure 51

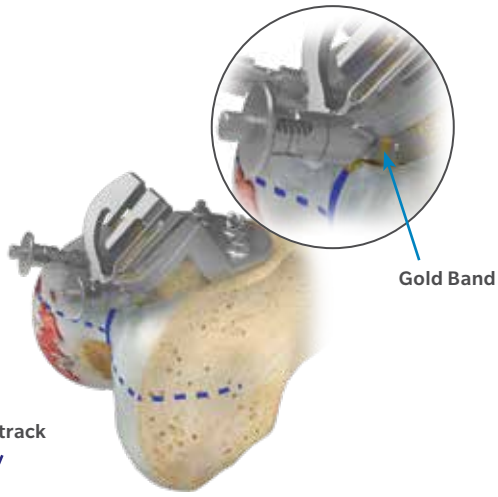


Figure 52

Lateral tracks

Depress and hold spring-loaded button on the lateral foot. Pull up until stop is reached and release the button. ("Mill" position – The gold band should be visible above guide) (Figure 50). This will allow the Milling Handpiece to pass under the raised foot.

Note: Failure to raise the foot to the "Mill" position will result in damage to the Milling Guide and Burr.

Technique Tip: If the Milling Handpiece appears to "stick" in area near feet, make sure foot is fully raised.

Mill the entire lateral track (all tracks in the lateral zone) (Figure 51). After milling the lateral tracks, disengage the throttle lever on Milling Handpiece prior to exiting the track. Depress the button and push the lateral foot into its down or "Stabilize" position (gold band visible below the guide) (Figure 52). The lateral foot will now be resting on the resurfaced bone ensuring stability of the guide when milling the opposing track.

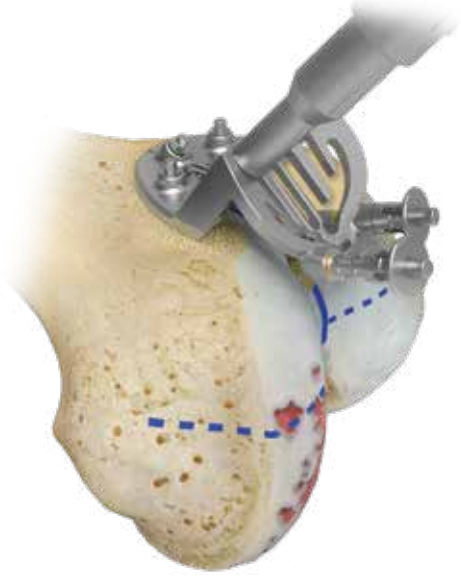


Figure 53

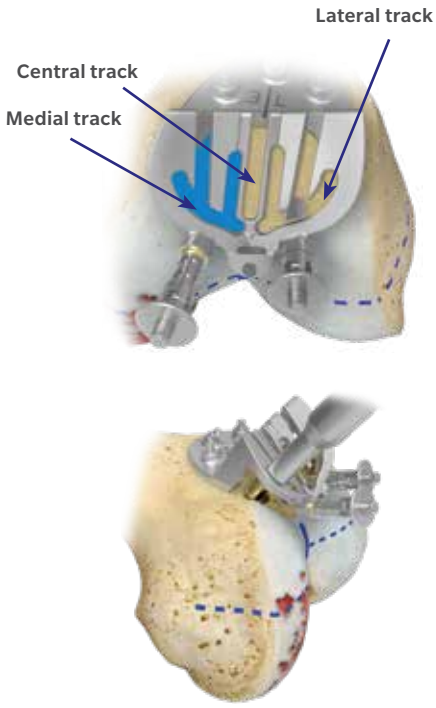


Figure 54

Mill Femoral Trochlea (cont.)

Medial Tracks

Depress and hold spring-loaded button on the medial foot. Pull up until stop is reached and release the button. ("Mill" position – The gold band should be visible above guide) (Figure 53).

Note: Failure to raise the foot to the "Mill" position will result in damage to the Milling Guide and Burr.

Mill the entire medial track (all tracks in medial zone) (Figure 54). After milling the medial tracks, disengage the throttle lever prior to exiting the track. Return throttle safety slide to "safe" or full forward position.

Make sure that all paths of the distal bone preparation have been milled. Remove the screws and the Milling Guide and irrigate to remove all bone and cartilage debris.

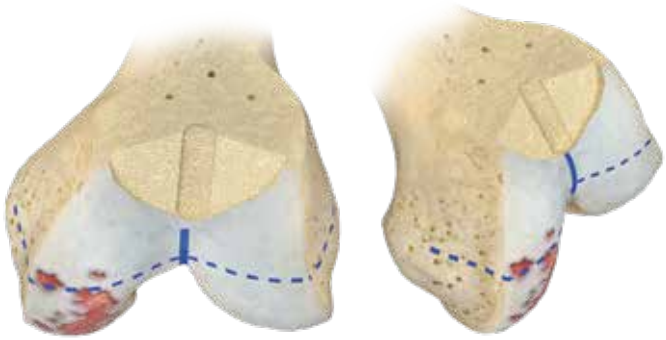


Figure 55

Medial Tracks (cont.)

The bone preparation should appear as illustrated (Figure 55). Please note that a small area of bone may remain distally but will be removed during the tail preparation. Freehand removal is not recommended.

Figure 56

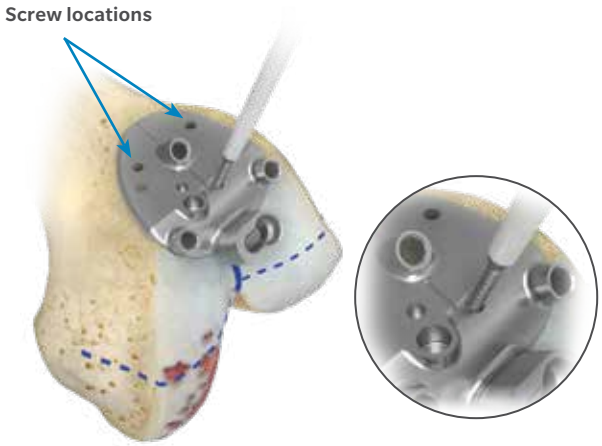


Figure 57

Drill Peg and Tail Holes

Select the appropriate size Peg/Tail Guide (left or right). The Peg/Tail Guides match the outside geometry and inlayed thickness of the trochlear implant. Insert the guide in place and ensure that it is fully seated against the anterior and distal surfaces (Figure 56).

Technique Tip: Apply pressure distally on the guide until the guide is against the prepared distal ledges.

Secure it with three 33 mm screw(s) and tighten sequentially (Figure 57). Use of the 33 mm screw(s) will prevent violation of the posterior cortex.

Technique Tip: To maintain screw purchase and avoid malpositioning of the guide, do not over-tighten the screws.

Caution: The Peg/Tail Guide outside geometry matches the implant, and therefore placement of the guide is critical.

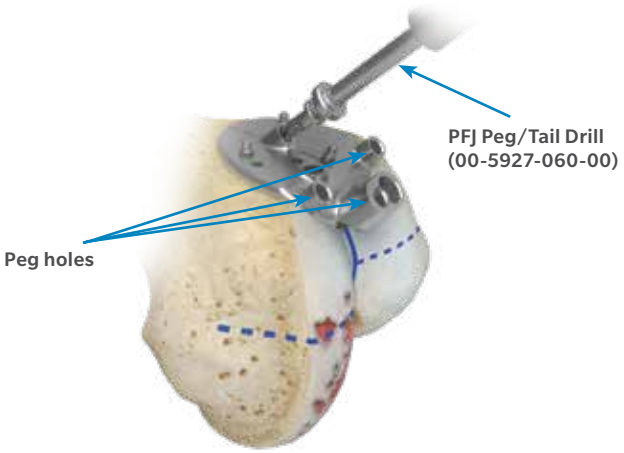


Figure 58

Drill the anterior, medial, and lateral peg holes (Figure 58).

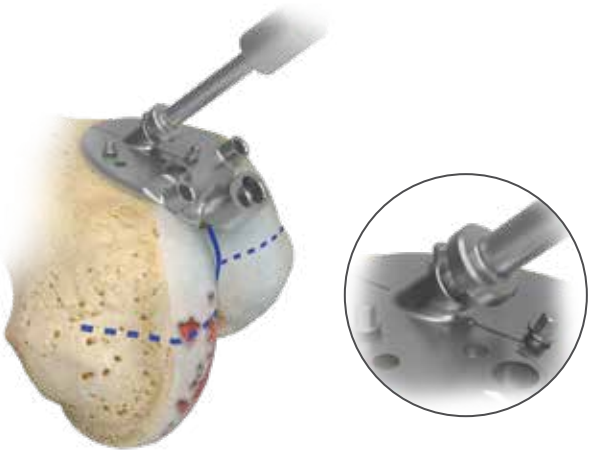


Figure 59

Drill the full depth until the shoulder of the drill stops against the boss for each peg hole (Figure 59).

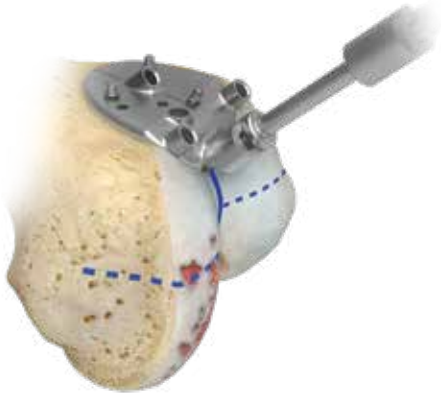


Figure 60

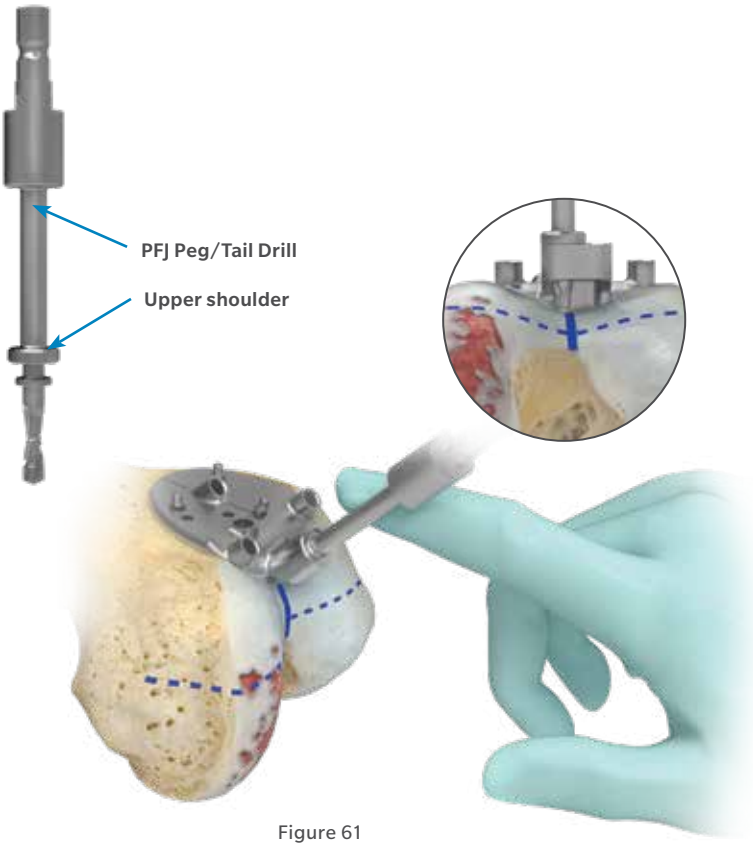


Figure 61

Drill Peg and Tail Holes (cont.)

Drill the tail slot (distal oval peg) by inserting the drill into the entry hole on the guide (Figure 60).

Once the upper shoulder on the drill reaches the boss on the guide, continue drilling while sliding the drill from left to right. The drill's upper shoulder must remain flush with the guide's boss.

Technique Tip: Applying pressure (drill shaft) to the right with a finger may aid the drill movement (Figure 61). Take care to prevent glove from catching.

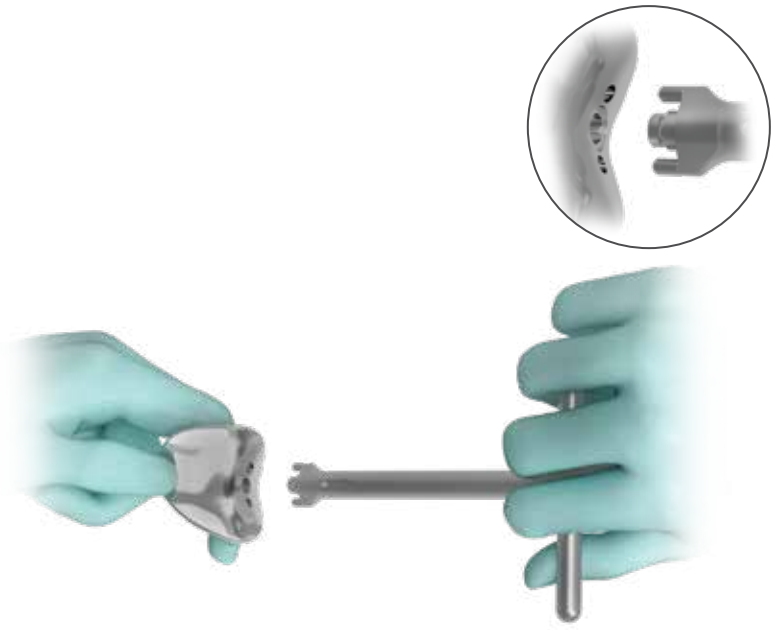


Figure 62

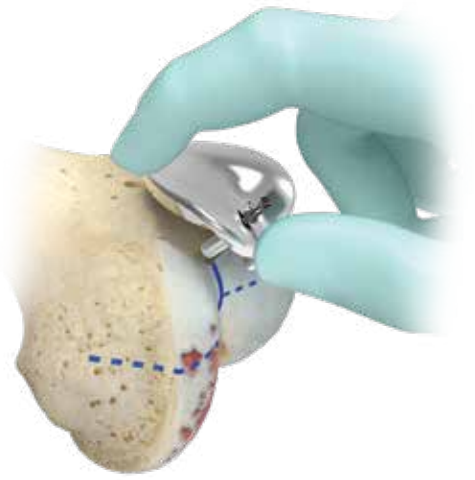


Figure 63

Perform Trial Reduction

Attach the Inserter/Extractor Handle to the appropriate size PFJ Provisional (left or right) (Figure 62).

Technique Tip: The provisional can be inserted onto the femur by hand if desired (Figure 63).

Perform Trial Reduction (cont.)

Insert the provisional onto the femur, taking care to properly align the pegs and tail with the holes (Figure 64). The pegs should engage into peg holes at the same time.

Once inserted in place, remove the Inserter/Extractor Handle and impact the provisional with the PFJ Impactor until it is fully seated.

The impaction force should be delivered in the direction of the pegs' axis (Figures 64-66).

Caution: Some press-fit may be necessary to ensure an optimal fit, but be careful to avoid impinging or damaging cartilage at the transition area during impaction.

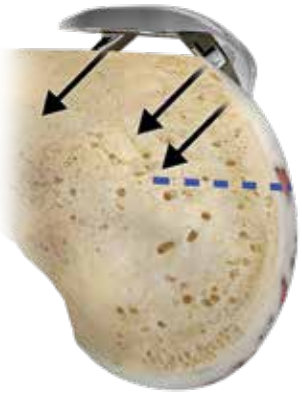


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Figure 64

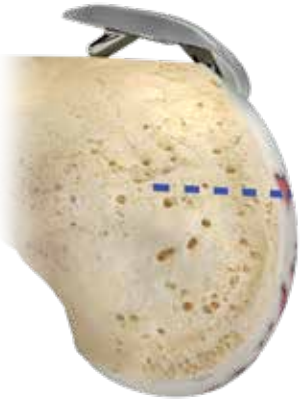

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Figure 65

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Figure 66

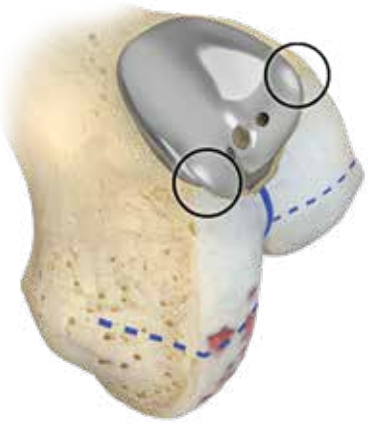

Figure 67

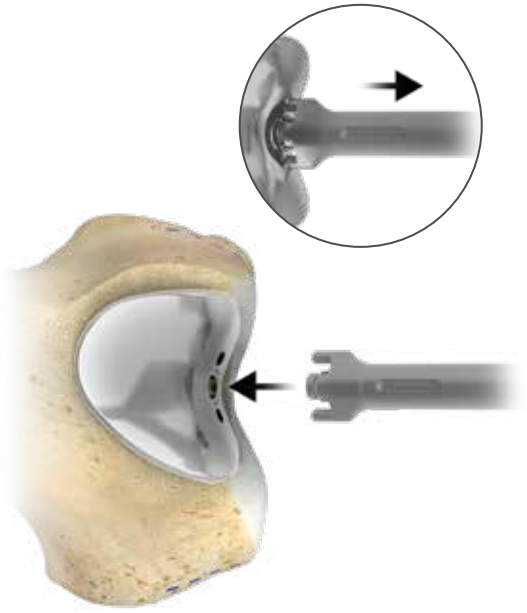

Figure 68

Insert the appropriate Patella Provisional. Evaluate patellofemoral tracking throughout range of motion.

Note: The patella should transition smoothly throughout range-of-motion.

Technique Tip: If necessary, remaining cartilage at the edge of the anterior cut shown circled in Figure 67, in particular sharp corners, may be blended to prevent soft tissue irritation. Also, areas around the patella may be blended to prevent impingement and provide for smoother contact.

Remove the Patella Provisional. Attach the Inserter/Extractor handle to the PFJ Provisional (trochlea) (Figure 68). Carefully remove the provisional in the direction of the pegs' axis. Attach slaphammer to the end of the Inserter/Extractor handle to aid in removal.

Caution: Do not rock the provisional back and forth during removal as this could compromise the bone preparation, peg hole preparation, surrounding cartilage, and the implant's fit.

At this point, all trial components should be removed from the bone and preparation for the Persona Partial Knee replacement should begin. If PFJ trial components are left in place, they can interfere with the Persona Partial Knee instrumentation. Preparation for the medial compartment can now begin.

Chapter 3
Persona Partial Knee

Figure 69

Figure 70

Osteophyte Excision

All osteophytes must be removed from the medial margin of the medial femoral condyle and from both margins of the intercondylar notch, around the ACL (Figure 69). Varying the amount of flexion and extension of the knee will allow the surgeon to visualize the various osteophytes facilitating removal. Osteophytes on the tibial plateau in front of the insertion of the ACL and in the intercondylar notch must be removed, this is one way to correct the presence of a fixed flexion deformity. If there are large osteophytes around the patella they can also be removed. Osteophytes beneath the medial collateral ligament (Figure 70) and from the posterolateral margin of the medial condyle in the intercondylar notch should be removed. This creates room to insert the saw blade into the intercondylar notch during the next steps.

Technique Tip: It is important for osteophytes to be removed before balancing your flexion and extension space.

Technique Tip: A 6 mm chisel is helpful in removing osteophytes.

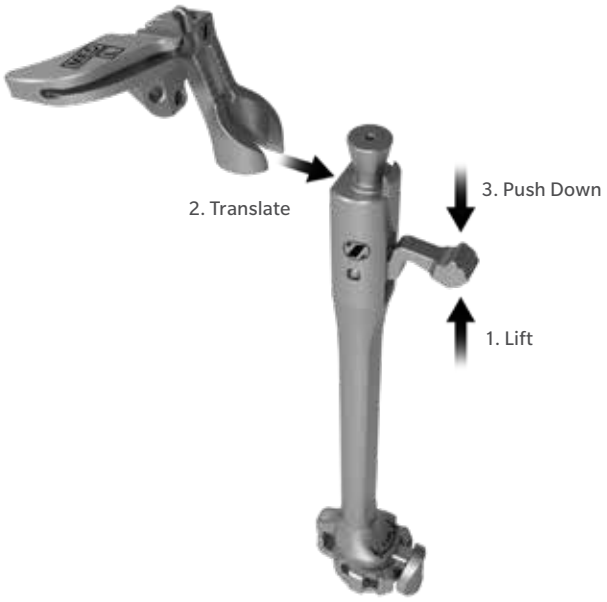

Figure 71

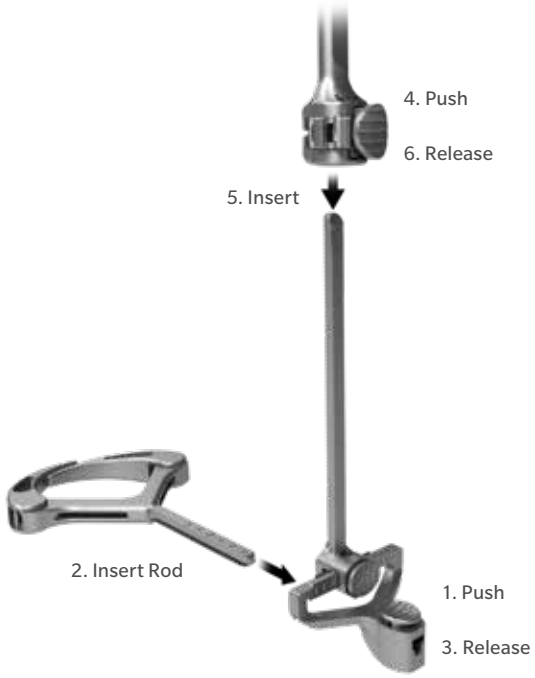

Figure 72

Proximal Tibial Resection

Assemble the extramedullary (EM) alignment guide. Attach the tibial cut guide to the EM alignment guide by lifting the lever of the EM proximal tube translating the tibial cut guide onto the top of the EM proximal tube, under the locking cone. Secure by pushing the lever on the EM proximal tube down to lock the tibial cut guide in place (Figure 71).

Depress and hold the button on the EM distal rod and insert the threaded rod on the EM ankle clamp into the EM distal rod and release the button. Depress and hold the button on the distal end of the EM proximal tube and insert the EM distal rod into the EM proximal tube and release the button (Figure 72).

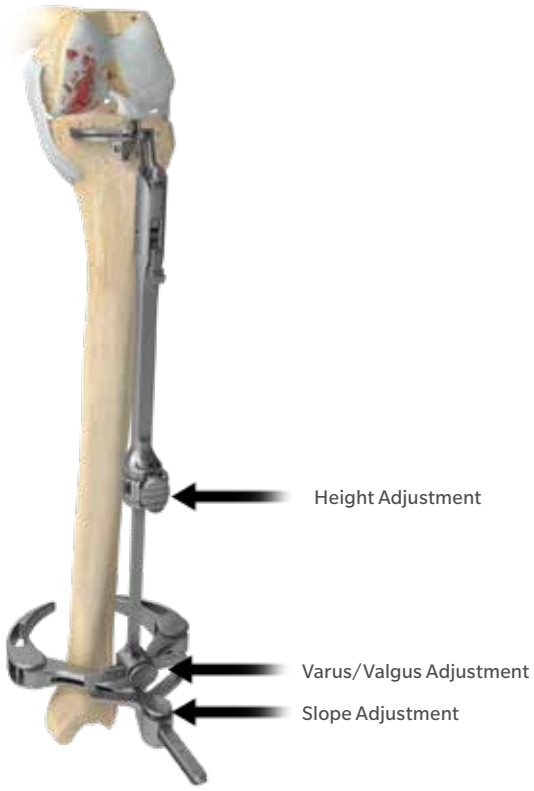

Figure 73

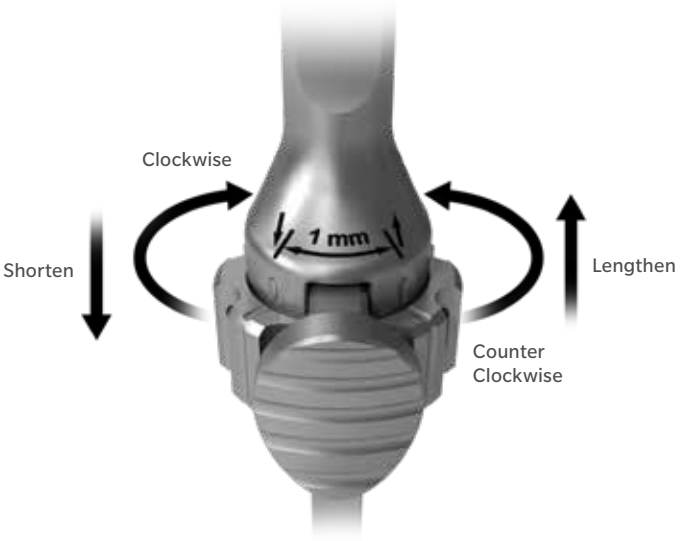

Figure 74

Proximal Tibial Resection (cont.)

The buttons shown in Figure 73 are used to adjust the tibial cut guide in the following manner: varus/valgus angle, posterior slope, and the height or depth of resection. The height adjustment button can be depressed for macro-adjustment or the dial can be rotated for micro-adjustment.

One full rotation of the dial equals 4 mm of height adjustment and ¼ turn equals 1 mm of height adjustment (Figure 74). Rotating the height adjustment dial clockwise lowers the EM alignment guide for resecting more tibia. Rotating the dial counterclockwise raises the EM alignment guide for resecting less tibia.

Figure 75

Figure 76

Secure the distal portion of the assembly by placing the spring arms of the EM ankle clamp around the ankle proximal to the malleoli. Use the posterior slope adjustment and varus/valgus adjustment to set the EM alignment guide parallel with the long axis of the tibia in both frontal (Figure 75) and sagittal (Figure 76) planes.

This will set the tibial resection perpendicular to the mechanical axis with 5 degrees of posterior slope. The tibial cut guide has 5 degrees of posterior slope built in. Correct rotation can be achieved from lining up the guide on the tibial tubercle proximally (junction of middle and medial third) and the center of the talus distally (medial to the midpoint of the ankle).

Figure 77

Figure 78

Figure 79

Proximal Tibial Resection (cont.)

Use the height adjustment to set the tibial cut guide at the approximate resection level (Figure 77). **Set the position of the sagittal cut slot so that the resection plane will be adjacent to the medial fibers of the ACL attachment and pass just medial to the apex of the medial tibial spine.** An angel wing may be used through the slot to help visualize the resection plane and rotation (Figure 78).

Insert a headless trocar pin through the center of the 12 mm vertical slot to set the position of the sagittal cut slot (Figure 79). The goal is to obtain optimal coverage of the tibial plateau, so the M/L position should be as far lateral as possible without impinging on the insertion of the ACL.

Technique Tip: It is important to insert the headless trocar pin through the center of the 12 mm vertical slot when setting the position of the sagittal cut slot. This allows adjustment both up and down to set the optimal depth of the tibial cut.

Technique Tip: When using any headless trochar pin, it is important to leave 10 mm or more of the pin exposed. This will allow for ease of removal when using the pin puller.

Figure 80

Figure 81

Figure 82

Insert the foot of the tibial stylus into the cutting slot of the tibial cut guide (Figure 80). Using the 4 mm tip of the stylus, adjust the final height of the tibial cut guide by rotating the micro-adjustment of the EM proximal tube clockwise (downward adjustment) or counter clockwise (upward adjustment) to contact the tibial stylus tip to the lowest point of the worn antero-medial tibial plateau (Figure 80).

A thinner cut may be desired if there is severe wear of the tibia. In this case, the 2 mm tip of the stylus can be used (Figure 81). An angel wing can be placed through the cut slot on the tibial cut guide to confirm the desired level and slope of the proximal tibial resection (Figure 82). If more or less slope is required this can be adjusted by using the slope adjustment buttons of the EM alignment guide.

Figure 83

Figure 84

Proximal Tibial Resection (cont.)

Secure the tibial cut guide by inserting a headless trocar pin through the corner hole of the tibial cut guide followed by inserting another headless trocar pin through the parallel hole of the tibial cut guide (Figure 83).

Technique Tip: When using any headless trochar pin, it is important to leave 10 mm or more of the pin exposed. This will allow for ease of removal when using the pin puller.

The headless trocar pin through the corner hole will act as a saw stop for the sagittal and horizontal resections. Use a single-sided reciprocating saw blade through the vertical slot in the tibial cut guide to make the sagittal cut. The saw cut should be just medial to the apex of the medial tibial spine and pass medial to or just through the medial edge of the ACL insertion (Figure 84).

Technique Tip: If the saw blade is lying too medial or lateral when lined up in the vertical slot it can be placed adjacent but parallel to the slot utilizing the grooves incorporated in the tibial cut guide. In this case surgeons need to be aware that the saw blade will not come into contact with the trochar pin and care must be taken to keep the saw parallel to the pin in the corner hole and stop cutting adjacent to it.

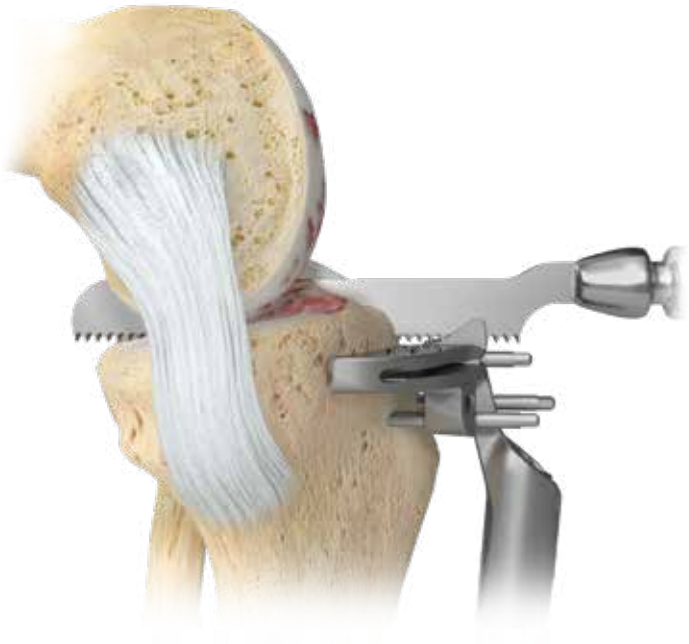

Figure 85

The sagittal cut can be made now. Make sure the saw reaches the back of the tibial plateau and a little beyond advancing the saw vertically down until it rests on pin through the corner hole. Do not lift the saw handle as this will lead to a vertical cut below the horizontal cut surface and increase the risk of post-operative tibial plateau fracture (Figure 85).

Technique Tip: Avoid damaging the posterior popliteal area by using a blunt tip reciprocating blade.

Before making the horizontal cut insert a medial collateral ligament (MCL) retractor. Ensure this retractor lies between the saw and the MCL, protecting the deep fibers of the ligament. Use a 1.27 mm (0.050 – inch) x 12.5/13 mm oscillating blade through the cut slot in the tibial cut guide to make the horizontal tibial cut. Ensure the saw blade is guided along the MCL retractor to cut the medial cortex completely without damaging the MCL. When the cut is complete the plateau usually can be seen to move freely.

Figure 86

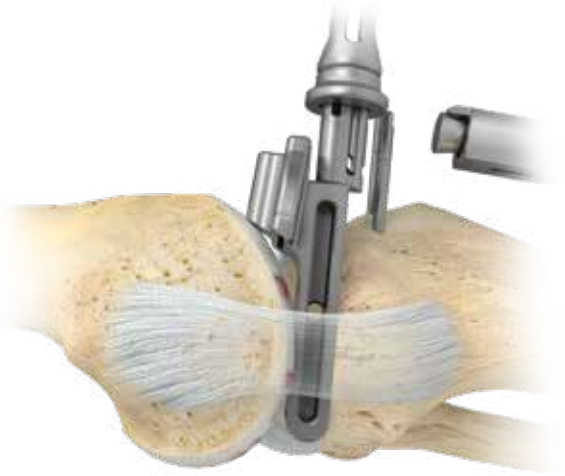

Figure 87

Figure 88

Verifying the Tibial Cut

Place an osteotome into the horizontal osteotomy and lift it upwards to remove the resected tibial plateau. Flexing the knee 10–15 degrees may assist with removal of the resected tibial plateau. Soft tissue attachments posteromedial may need to be released with a bovie or a knife. Examination of the excised tibial plateau should show the features typical of anteromedial arthritis (Figure 86), full thickness cartilage loss anteriorly and relative preservation of the cartilage posteriorly. If this pattern is not observed re-asses the status of the ACL. The excised plateau can be examined to check if the desired posterior slope has been achieved.

Remove the tibial cut guide from the EM alignment guide leaving the EM alignment guide in place along with headless trocar pins used to secure the tibial cut guide (the pin in the corner hole will be removed with the excised plateau). Attach the PK (Partial Knee) handle to the 9 mm spacer block to facilitate insertion of the spacer block into the joint space. With the knee flexed to 5–10 degrees insert the 9 mm spacer block to ensure the tibial resection is sufficient (Figure 87).

The thickness is correct when the 9 mm spacer block can slide easily in and out. If the 9 mm spacer block is too loose, use a thicker spacer block to fill the extension gap.

If the 9 mm spacer block or handle has to be firmly gripped to slide in and out, this is too tight, additional tibial resection is required. To re-cut the proximal tibia, apply the 2 mm recutter over the headless trocar pins and reattach the EM alignment guide (Figure 88). A headless trocar pin can be inserted into the oblique hole if additional fixation is desired. Use an oscillating saw with a 1.27 mm (0.050-inch) x 12.5/13 mm blade to cut the tibia through the horizontal slot in the 2 mm recutter taking care to avoid undercutting the tibial eminence as the corner pin is not present. Remove the 2 mm recutter and re-check the extension gap with the 9 mm spacer block to ensure the tibial resection is now sufficient.

Technique Tip: It is recommended to use a 9 mm spacer block instead of an 8 mm spacer block as a 9 mm spacer allows the surgeon intraoperative flexibility of +/- 1 mm.

Figure 89

Figure 90

Verifying Limb Alignment

Two options are available for verifying limb alignment.

Option #1: With the spacer block inserted into the extension space, assemble the alignment rods. Place the proximal end of the alignment rod at the center of the femoral head and distally at the center of the ankle. Relative to the midline of the knee, the rod will fall medial to the midline of the knee indicating the knee is not over corrected (Figure 89).

Option #2: Attach the alignment tower to the spacer block and insert the alignment rod through the alignment tower confirming the knee is not over corrected (Figure 90).

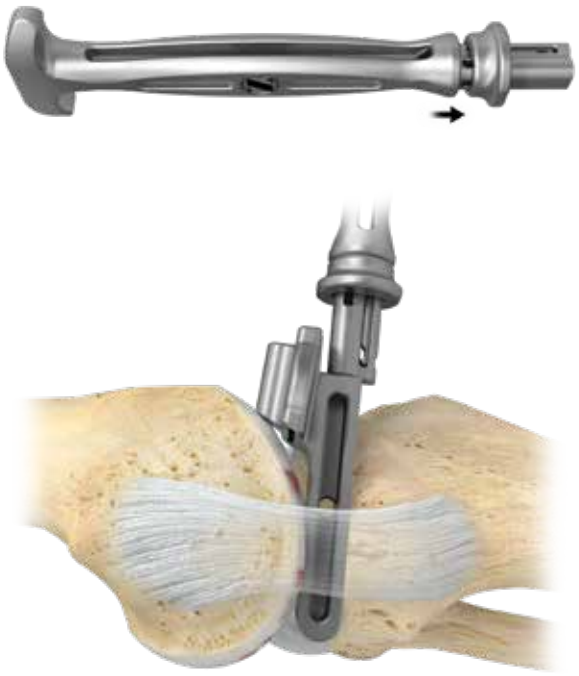

Figure 91

Figure 92

Distal Femoral Condyle Resection

For ease of insertion attach the PK handle to the anterior attachment of the spacer block (Figure 80). With the knee in extension, insert the 9 mm spacer block, or the thickness used earlier to confirm the tibial resection, until the distal femoral cut slot contacts the anterior aspect of the femur or posterior soft tissues prevent further insertion of the spacer block (Figure 91). It is important to confirm the spacer block is fully inserted, sitting flat on the resected tibia, and contacting the distal femur. Remove any anterior osteophytes if necessary. Confirm the knee is not hyperextended. With the distal femoral cut slot centered on the femoral condyle use a 48 mm headed screw to secure the spacer block in place (Figure 92).

Make the distal femoral cut using a 1.27 mm (0.050 in) x 12.5/13 mm oscillating saw blade. It is important to avoid making the distal femoral cut in hyperextension. To avoid damaging the posterior popliteal area, do not extend the saw blade posteriorly past the distal femur while the leg is held in extension. Insert a retractor to protect the MCL. Remove the 48 mm headed screw and spacer block.

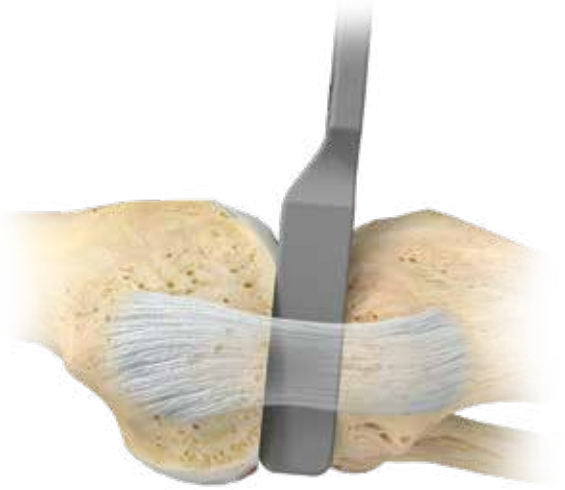

Figure 93

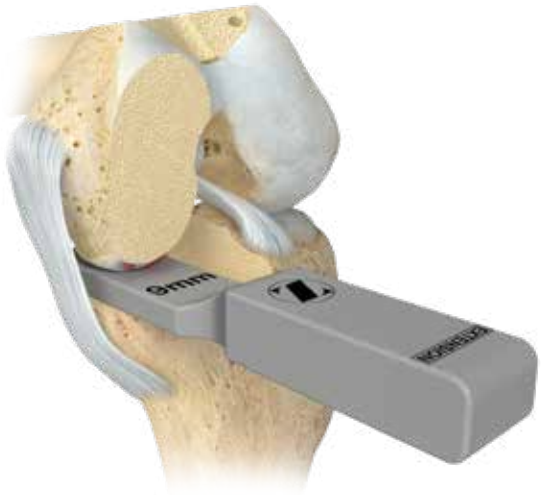

Figure 94

Confirming the Flexion and Extension Gaps

Select the flexion/extension gap checker thickness that matched the spacer block thickness used in the previous step. Insert the thick end of the flexion/extension gap checker (labeled EXTENSION) in extension. It is important to measure the extension gap in 5–10 degrees of flexion, confirming the knee will reach full extension. In full extension, the posterior capsule is tight, and its influence gives a false under-measurement. The thickness of the EXTENSION end duplicates the combined thickness of the corresponding tibial component bearing construct and femoral component in extension giving the feel of the implanted components (Figure 93). Confirmation of the correct thickness is obtained by confirming that the next thickest flexion/extension gap checker is difficult to insert and the next thinnest flexion/extension gap checker is loose while inserting. It is important to ensure a slight under correction of the limb alignment and have appropriate ligamentous tension restored (at least 2 mm of laxity) in extension.

With the knee in about 100 degrees of flexion carefully measure the flexion gap with the thin end (labeled FLEXION) of the same thickness flexion/extension gap checker previously used when checking the extension gap (Figure 94). The thin end of each flexion/extension gap checker simulates the feel of the implanted components in flexion. The thickness is correct when the flexion/extension gap checker will easily slide in and out. Confirmation of the correct thickness is obtained by confirming that the next thickest flexion/extension gap checker is difficult to insert and the next thinnest flexion/extension gap checker is loose. It is important to ensure appropriate ligamentous tension is restored (>=2 mm of laxity) in flexion.

Technique Tip: The thin end (labeled FLEXION) of any flexion / extension gap checker is 2 mm thinner than the number listed (example: 9 mm flexion / extension gap checker is really 7 mm on the thin end). See page 44 for rationale.

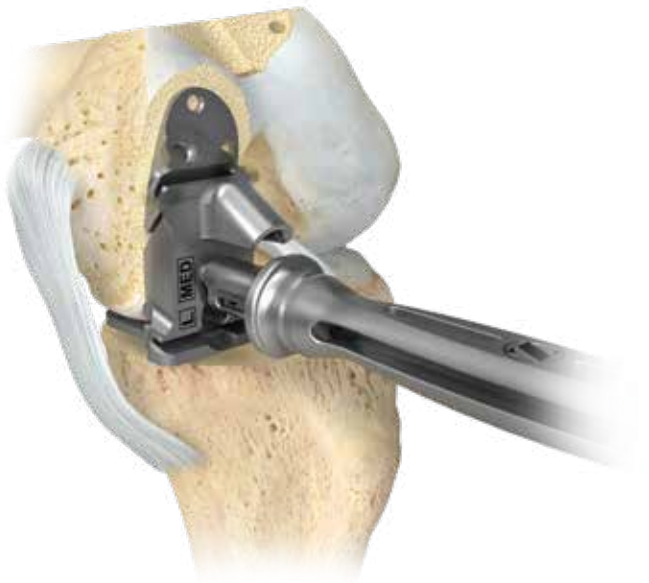

Figure 95

Confirming the Flexion and Extension Gaps (cont.)

- The thin end of each spacer is simulating the feel of the implanted components in flexion.
- When making the posterior femoral resection a +2 mm resection is made to anteriorize the femoral component 2 mm and open up the flexion space. This accounts for the intact cartilage on the posterior femoral condyle.
- It is important to ensure appropriate ligamentous tension is restored (>=2 mm of laxity) in flexion.
- If the feel of extension gap is appropriate but the flexion gap is too tight utilize the bone rasp or saw to remove 1–2 mm of posterior femoral cartilage prior to finishing the femur.

Femoral Sizing

For ease of insertion attach the PK handle to the anterior attachment on the femoral finishing guide (Figure 95). Use the femoral finishing guide to establish the appropriate femoral size. The profile of each femoral finishing guide matches the location and profile of the corresponding femoral component anteriorly and distally. With the knee in about 100 degrees of flexion place the guide on the resected distal surface and the retained posterior condyle (Figure 95). Be cautious of any soft tissue or retained osteophytes that might keep the femoral finishing guide from sitting flush against the end of the distal femur.

Figure 96

Figure 97

When properly sized, there should be a rim of at least 2 mm exposed bone anterior and medial to the femoral finishing guide once osteophytes have been removed. It is also important to avoid any contact between the anterior portion of the femoral component and the distal medial part of the PFJ component. For that purpose, make sure that at least 2 mm of anterior femoral bone remains uncovered at the time of femoral sizing in order to maintain 2–3 mm of space between the femoral component of the Persona Partial Knee and the PFJ component. Downsizing the Persona Partial Knee femoral component to avoid contact does not influence gap kinematics. A smaller femoral component size will be a solution to avoid impingement of components the PFJ and the Persona Partial Knee componenet.

The medial/lateral position of the femoral finishing guide is also established at this point. The femoral finishing guide should be lateralized as far as possible without impinging into the intercondylar notch (Figure 96). This will increase the likelihood that the tibial component will properly track with the femur in extension and prevent patellofemoral impingement. Proper position is confirmed by ensuring there is no medial or lateral overhang.

If the femoral condyle appears to be between two sizes, choose the smaller size. This prevents overhang, which can lead to patellar impingement (Figure 97).

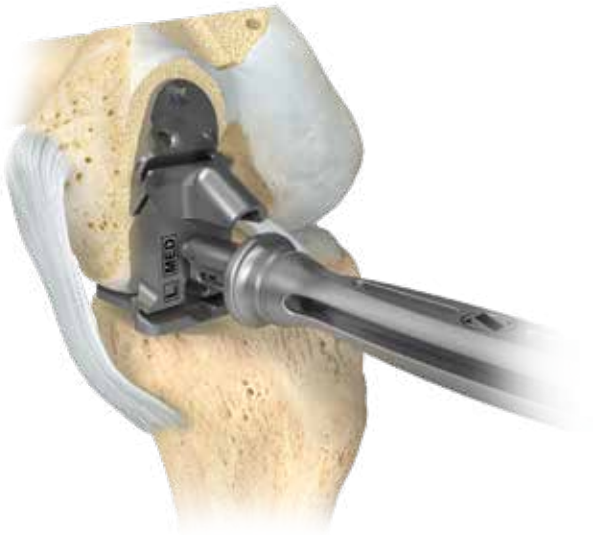

Figure 98

Figure 99

Femoral Posterior Cut, Chamfer Cut, and Peg Hole Preparation

With the proper size femoral finishing guide in position, fix the guide by inserting a 48 mm headed screw into the top pin hole (Figure 98). Be sure to rotate the guide on the screw until the posterior edge of the guide is parallel to the proximal tibial cut surface. Insertion of the thin side (labeled FLEXION) of the flexion/extension gap checker underneath the femoral finishing guide will help to ensure that the surfaces are parallel. If used, the flexion/extension gap checker should be inserted prior to securing the guide with a screw to ensure sizing did not change. It is essential that there is exposed bone on both medial and lateral sides of the femoral finishing guide to ensure that the femoral finishing guide does not overhang.

At this point insert a 48 mm or 33 mm headed screw into the angled anterior pin hole (Figure 99). Consider the size of the bone when selecting the screw length to avoid perforating the posterior cortex. An additional screw can be used, if necessary, to adequately secure the guide to the bone. If a screw is used in the hole nearest the size marking, it must be removed prior to performing the posterior chamfer cut.

Figure 100

Figure 101

Once the femoral finishing guide is determined to be properly oriented and secured, insert the femoral drill with stop into the anterior hole until the stop contacts the femoral finishing guide to drill for the anterior femoral peg (Figure 100).

Next, insert the femoral drill with stop into the posterior hole until the stop contacts the femoral finishing guide to drill for the posterior femoral peg (Figure 101).

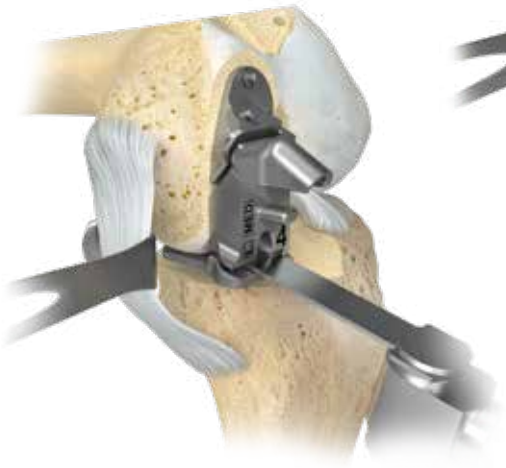

Figure 102

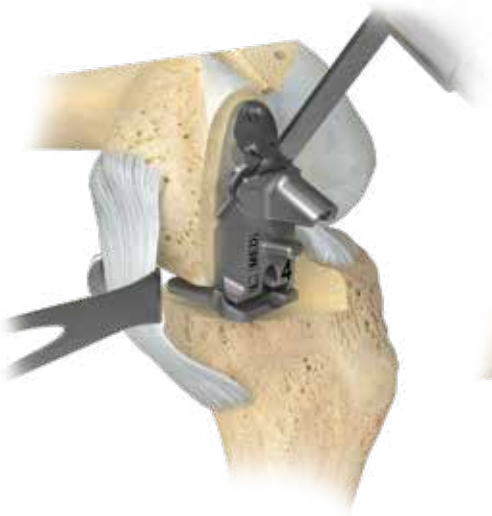

Figure 103

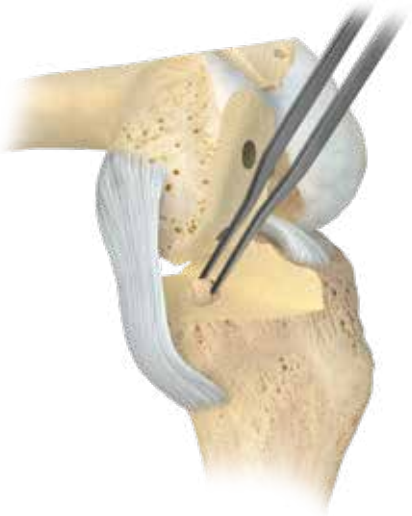

Figure 104

Femoral Posterior Cut, Chamfer Cut, and Peg Hole Preparation (cont.)

Insert a retractor to protect the MCL. Using a 1.27 mm (0.050 in) x 12.5/13 mm oscillating saw, cut the posterior femoral condyle followed by cutting the posterior femoral chamfer through the cut slot (Figures 102 and 103). Take care to avoid damage to the medial collateral and anterior cruciate ligament. Remove the headed screws and the femoral finishing guide checking to make sure all cut surfaces are flat.

Resect any remaining meniscus and remove any osteophytes, especially those interfering with the collateral ligament (Figure 104). Any superior posterior femoral osteophytes should be removed from the medial femoral condyle with a straight or curved osteotome to avoid impingement in deep flexion.

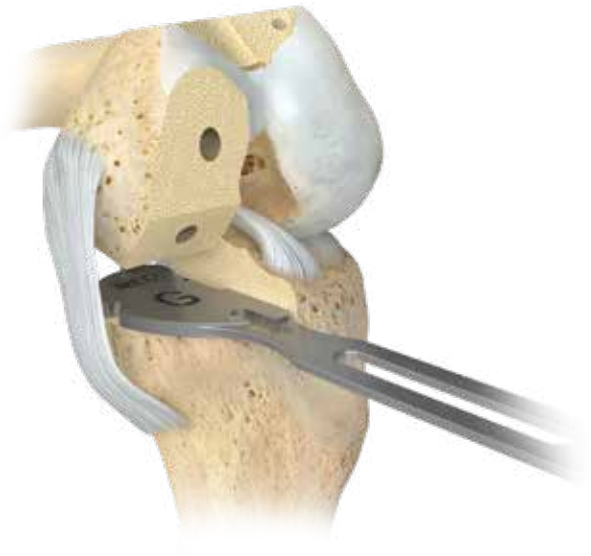

Figure 105

Figure 106

Size the Tibia

Insert the appropriate tibial sizer that best covers the resected proximal tibia in both the A/P and the M/L dimensions (Figure 105).

To ensure the correct size, position the tibial sizer with its posterior margin flush with the posterior tibial cortex. This is facilitated by positioning the tibial sizer laterally against the vertical cut and using the hook (Figure 106) of the tibial sizer over the posterior cortex of the tibia.

Figure 107

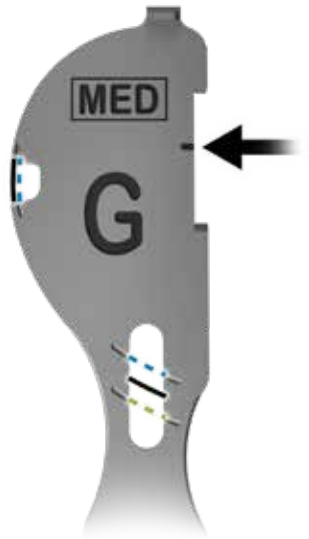

Figure 108

Size the Tibia (cont.)

The tibial sizer should be flush with the medial cortex. Visibility windows are provided at the anterior and medial borders, with engravings that represent the profile of neighboring sizes (Figure 107). These can be used to gauge whether a neighboring size should be used. If the size being evaluated overhangs, confirm that the vertical tibial resection is as far lateral as possible; or use a smaller tibial size. Medial overhang may cause pain and should be avoided.

The location of the keel on the tibial component may be marked through the slot on the medial edge of the tibial sizer (Figure 108).

Figure 109

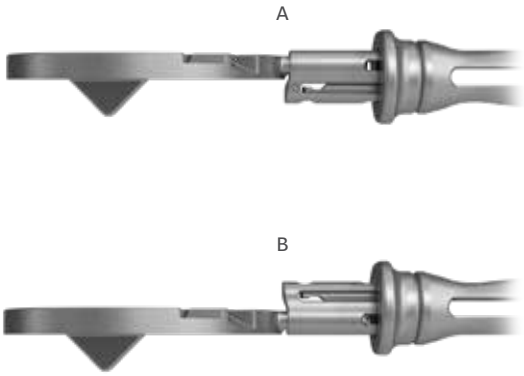

Figure 110

Finish the Tibia

For ease of insertion attach the PK handle to the anterior attachment on the tibial trial (Figure 109).

The PK handle can attach to the tibial trial in 2 orientations (Figure 110). It is recommended to attach the PK handle with the anterior stop distal to facilitate placement of the tibial trial (A). If posteriorization of the tibial trial is desired, the PK handle can be attached with the anterior stop proximal (B).

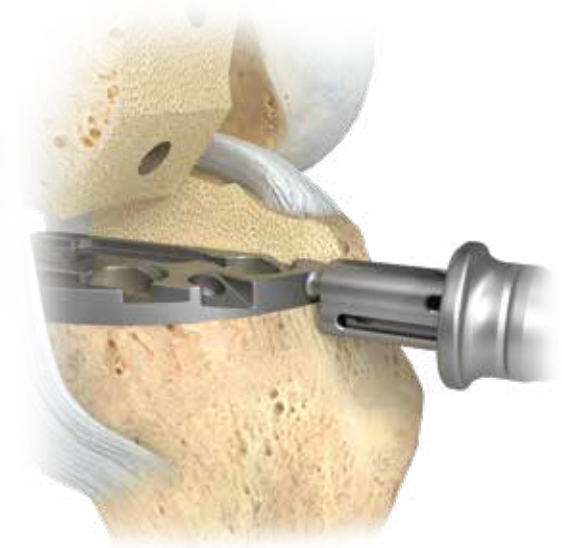

Figure 111

Figure 112

Finish the Tibia (cont.)

Proper placement of the tibial trial can be accomplished by directing the PK handle posterior until the anterior stop on the handle contacts the anterior tibial bone (Figure 111). Use the handle to drive the keel into the bone.

If necessary, insert the tibial impactor into the recess on the tibial trial and impact so it sits flush on the tibial surface (Figure 112). If sclerotic bone requires additional preparation for the keel, score the marked bone surface with sagittal saw or narrow chisel before inserting the tibial trial.

Figure 113

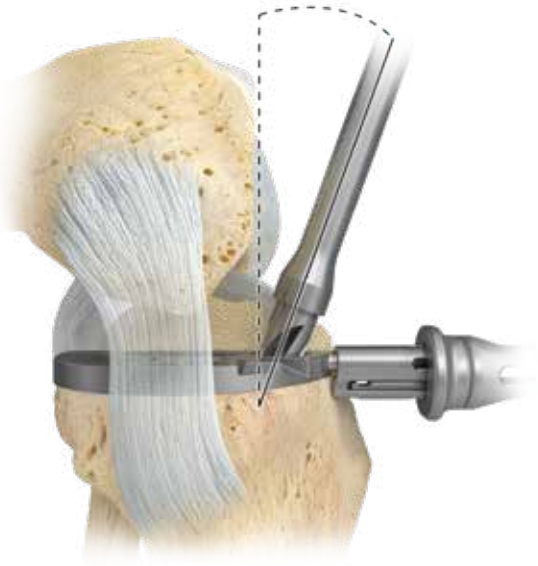

Figure 114

With the appropriate size tibial trial in place and flush on the tibial surface, insert the 33 mm headed screw into the anterior fixation hole (Figure 113). It is important to keep the PK handle attached when securing with the 33 mm headed screw in order to resist posterior shift of the tibial trial in the event over tightening of the 33 mm headed screw occurs.

The angle for drilling the tibial peg holes is 20 degrees, not perpendicular to the tibial trial. Align the tibial drill to the face of the 20 degree counterbore peg holes drilling to the drill stop (Figure 114). Remove the PK handle and leave the tibial trial in place to perform trial reduction.

Figure 115

Figure 116

Perform Trial Reduction

With all bone surfaces prepared, perform a trial reduction with the appropriate size femoral trial, tibial trial, and trial bearing. Attach the PK locking femoral impactor to the femoral trial component (Figure 115). This is performed by first ensuring the impaction pad is assembled to the impactor. Next, ensure the lock nut is disengaged (confirmed by rotating the lock nut counter clockwise until the threads are disengaged). Pinch the arms back to open the jaws and attach the jaws to the notches on the medial and lateral sides of the femoral trial ensuring the orientation of the femoral trial aligns with the marking on the impactor pad (ANT designates anterior, POST designates posterior). Lock the femoral trial to the PK locking impactor by rotating the lock nut clockwise until resistance is felt.

With the knee flexed, use the PK locking femoral impactor and insert the femoral trial (Figure 116). Insert the posterior (longer) peg first and impact the trial onto the femur with a mallet and ensure the anterior peg engages and the component is fully seated. Remove the PK locking femoral impactor by rotating the lock nut counter-clockwise (approximately 1 rotation) and pinching the arms to open the jaws.

Figure 117

Figure 118

Figure 119

Figure 120

Next select the appropriately sized trial bearing and slide into the grooves on the tibial trial (Figure 117).

Note: Care must be taken to ensure there is nothing between the tibial trial and trial bearing when it is inserted.

Before determining stability of the joint, the PFJ trial component should be inserted. With all trials in place manipulate the knee through a full range of motion to determine stability of the joint. Mid flexion clunk on the trials may occur due to the extraction hole in the femoral trial. Ensure the patella transitions smoothly in the early degrees of flexion into full flexion and that there is no contact with the Persona Partial Knee component. Ensure the patella is tracking correctly throughout all degrees of flexion and perform any lateral retinacular release whenever necessary.

With all trials in place manipulate the knee through a full range of motion to determine stability of the joint. Mid flexion clunk on the trials may occur due to the extraction hole in the femoral trial. Before final implantation check limb alignment one final time. It is important to ensure a slight under correction of the limb alignment and have appropriate ligamentous tension restored (2–3 mm of laxity) in flexion and extension.

Insert the 2 mm end of the tension gauge (“amber stick”) in flexion and extension to ensure that the gaps are not too tight (Figure 118). If trial bearing thickness exchange is required remove the trial bearing using the trial bearing remover (Figure 119). Once size and thickness of the components are confirmed, remove the trial components. Use the slaphammer for removal of the femoral trial (Figure 120). Insert the oval end of the slaphammer into the oval pocket on the femoral trial. Rotate the slaphammer 90 degrees medial (clockwise on a right knee, counter clockwise on a left knee).

Chapter 4
Cementing

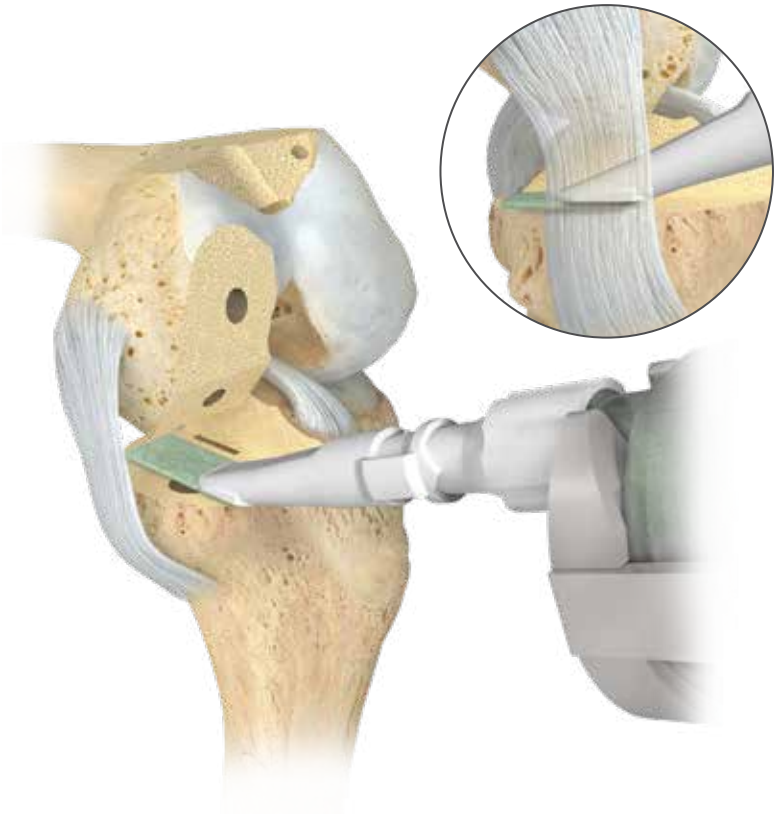

Figure 121

Implanting Final Components

The Persona Partial Knee components should be cemented before the PFJ components. This allows the knee to go into extension to ease insertion and implantation of trochlear component.

Obtain the final components. Due to space constraints the tibial component should be implanted first.

Tibia

If a tourniquet above the knee is not already in use, place and/or inflate throughout preparation of bone for cementation, as well as mixing, application and hardening of bone cement. If the tibial and femoral bone is dense or sclerotic, perforate the knee by drilling or punching an array of 2 mm holes, 2–3 mm deep, spaced 5 to 8 mm apart to improve cement penetration.

Cleanse all cement-receiving bone surfaces thoroughly using pulse lavage and dry with a clean, dry lap sponge. Next, mix a single 40g unit of cement. Use of a vacuum mixing cartridge is recommended as well as application of new gloves.

As soon as cement properties permit, apply a thin layer of cement over the entire underside of the tibial component. The cement should just overfill the pockets on the underside of the tray, up to 1 mm proud posteriorly and 2 mm proud anteriorly. Avoid contamination of the component-cement interface.

Apply cement to the tibia and pressurize the cement, striving for penetration of 3–4 mm.

- Use of a cement gun/cartridge equipped with a pressurizing nozzle is recommended to deliver and pressurize cement into the prepared holes and across the flat surface.

- Alternatively, cement may be applied manually and pressurized into the bone using a ½ inch (12.7 mm) or wider flat osteotome.

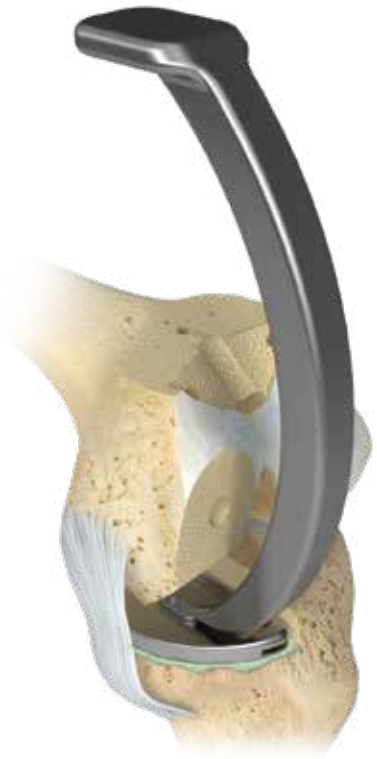

Figure 122

Implanting Final Components (cont.)

After pressurization, all cement that remains proud of the bone should be removed. A ½ inch (12.7 mm) curved osteotome, concave down, is useful to scrape away excess cement. If there is significant blood or saline on the cement surface, it can be carefully dried using a flat osteotome wrapped in a clean, dry lap sponge prior to final component placement. While drying blood or saline, make sure not to remove the cement that was just placed onto the surface.

To facilitate insertion, flex the knee and externally rotate the tibia. Press down on the posterior portion of the tibial component first to force excess cement anteriorly. Then press down on the anterior portion of the component.

Using the tibia plate impactor, impact the tibial component moving from posterior to anterior until fully seated (Figure 122). Remove any excess cement from posterior aspect of the tibia using the curved tonsile/hemostat provided.

The curved tonsile/hemostat can also be used to remove excess cement from the anterior aspect of the tibial tray.

Confirm that all cement has been removed from the proximal surface of the tibial component especially posterior near the locking mechanism. Any cement remaining will prevent the proper assembly of the trial bearing.

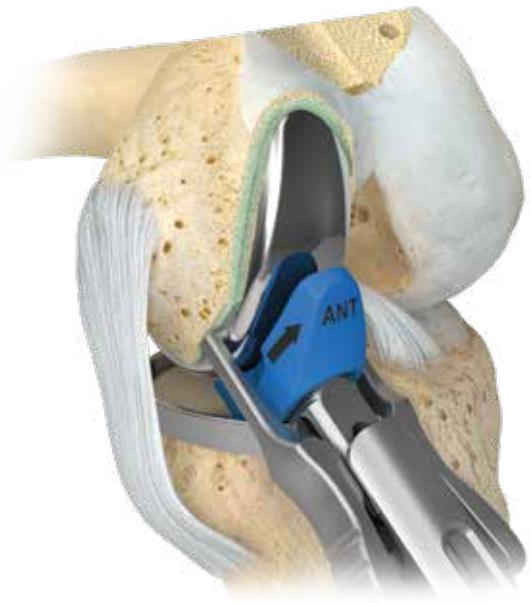

Figure 123

Femur

While mixing another 40g unit of cement, pulse lavage and dry the femoral side again. As soon as cement properties permit, apply a layer of cement over the entire bone-opposing surface of the femoral component. The cement should overfill the pockets on the distal and chamfer facet by 2–3 mm and on the posterior facet by 1–2 mm. Avoid contamination of the component-cement interface.

Apply cement to the prepared femur and pressurize the cement, striving for penetration of 3–4 mm.

- Use of a cement gun/cartridge equipped with a pressurizing nozzle is recommended.
- Alternatively, cement may be applied and pressurized manually.

Any cement remaining proud on the posterior facet should be scraped flush to the bone before proceeding so that it is not displaced and inaccessible upon seating the femoral component. With the femoral component assembled to the PK locking femoral impactor, begin the femoral component insertion with the leg in deep flexion. Insert the posterior (longer) peg first and impact the femoral component onto the femur with a mallet and ensure the anterior peg engages and the component is fully seated. The femoral impactor can be used to help fully seat the femoral component (Figure 123).

Remove excess cement in a routine manner.

Confirm that all cement has been removed from the proximal surface of the tibial component especially posterior near the locking mechanism. Any cement remaining will prevent the proper assembly of the bearing.

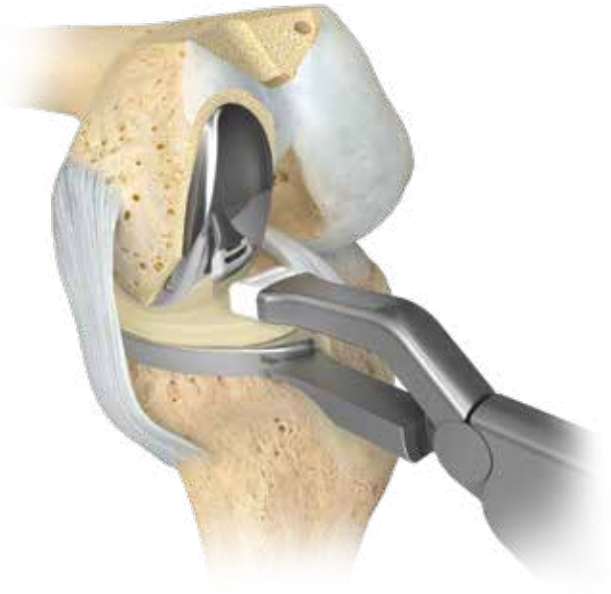

Figure 124

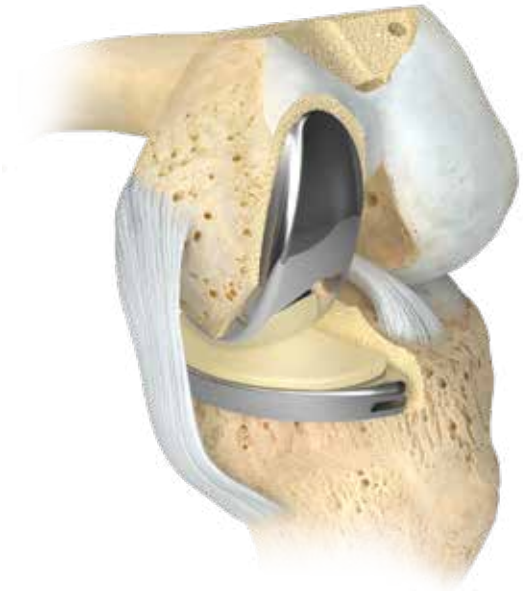

Figure 125

Implanting Final Components (cont.)

Confirm the correct size and thickness of the final bearing component by testing with the trial bearings in maximum flexion and extension. Use the tension gauge ("amber stick") to assess the flexion and extension gaps. Then recheck alignment to verify that the joint has not been over corrected. While cement is curing, put the leg in full extension with the trials and tension gauge in place.

Bearing Assembly

After the cement has cured, remove any remaining excess cement before the final placement of the tibial bearing. Do not proceed with locking the final bearing component until the cement has fully cured and all cement has been removed from the proximal surface and locking mechanism of the tibia component.

With the engraved side of the component bearing down, slide the posterior edge of the polyethylene component under the posterior tibial component.

Snap the disposable bearing inserter tip onto the tibial bearing inserter. Insert the tab on the lower jaw of the tibial bearing inserter into the notch on the front of the tibial component. Squeeze the handles of the inserter together until the component snaps into place (Figure 124) completing final component implantation (Figure 125).

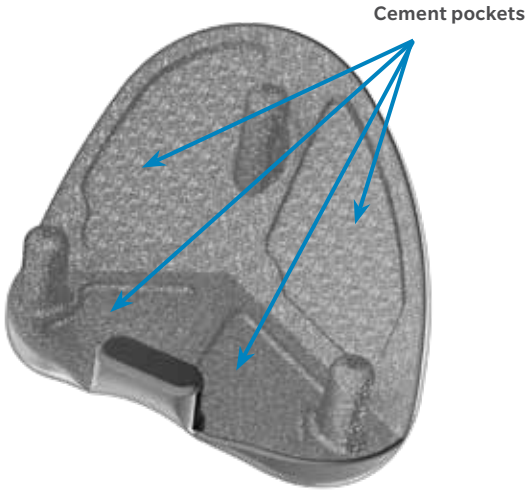

Figure 126

Figure 127

Implant Trochlea and Patella Prostheses

Cementing/Implanting the PFJ Implant (Trochlea)

Mix a new batch of cement. Select the appropriate size PFJ Implant (Left or Right). Apply bone cement to the under surface of the PFJ Implant (Figure 126) and/or femur as appropriate.

Technique Tip: If applying cement directly to the femur, mark the location of the peg holes (push cement down into holes) to aid in positioning the implant pegs during insertion.

Insert the PFJ Implant, taking care to properly align the pegs and tail with the holes. Once inserted, impact the implant with the PFJ Impactor until it is fully seated. The impaction force should be delivered in the direction of the pegs' axis (Figure 127).

Caution: Some press-fit may be necessary to ensure an optimal fit, but be careful to avoid impinging or damaging cartilage at the transition area during impaction.

Carefully remove excess cement. Press down on the implant with the impactor to help squeeze out excess bone cement.

Apply pressure on the implant until cement is cured.

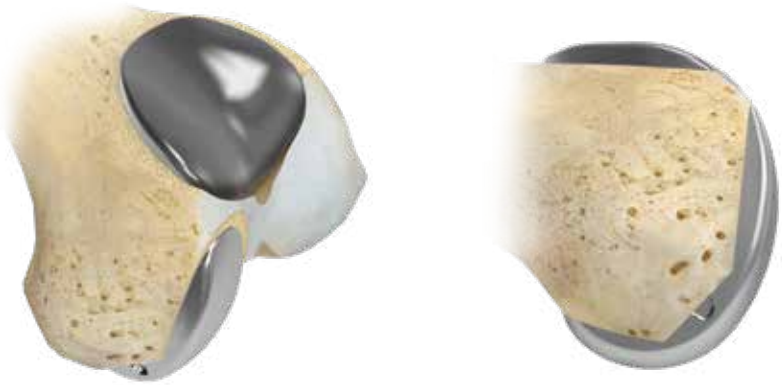

Figure 128

Implant Trochlea and Patella Prostheses (cont.)

Cementing/Implanting the Patella and Checking Motion

Insert the appropriate patella implant. Apply pressure until the cement is cured. Remove excess cement. Confirm patellofemoral tracking throughout range of motion. The patella should track centrally within the trochlear groove.

The patella should transition smoothly from the trochlear implant to the femoral condyles through flexion and extension.

There should be no patellar tilt, subluxation or catching on the implant.

Technique Tip: A lateral retinacular release can be performed for slight tilt or subluxation.

Closure

Irrigate the knee for the final time and close the wound in a routine manner.

Appendix: Backup Milling Procedure Rationale

Figure 129

Figure 130

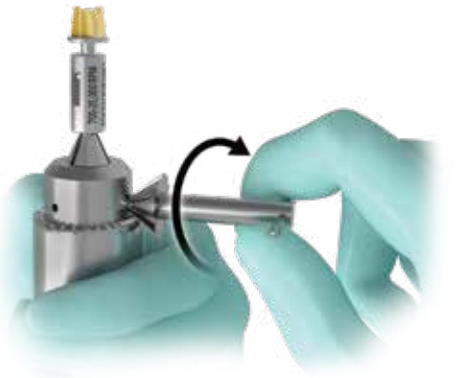

Figure 131

Appendix: Backup Milling Procedure Rationale

The PFJ Drill Milling Adapter can be used to complete the milling operation in the event the Milling Handpiece is inoperable at the time of surgery. The Drill Milling Adapter joins the PFJ Mill Burr to a standard surgical drill via a Jacob's Chuck and utilizes a PFJ Milling Guide for accurate bone preparation. The milling operation is more challenging when using this approach and should only be used as a backup to the Milling Handpiece.

Assembly

Insert new PFJ Mill Burr (00-5927-050-00) into the PFJ Drill Milling Adapter as shown in (Figure 129).

With a 1/4 in. or smaller Jacob's Chuck facing upright, insert the shank of the PFJ Mill Burr with PFJ Drill Milling Adapter into the Jacob's Chuck until they both bottom out (Figure 130). Tighten securely with chuck key (Figure 131). Rotate assembly to visually verify that the burr is clamped straight and that the PFJ Drill Milling Adapter rotates independently from the PFJ Mill Burr.

Figure 132

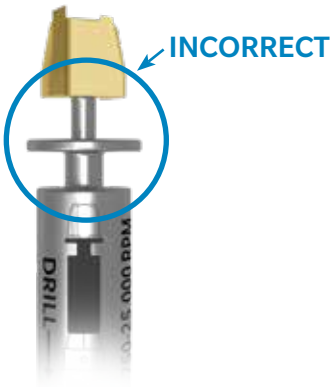

Figure 133

Appendix: Backup Milling Procedure Rationale (cont.)

Caution: To minimize the potential for over-resection, hold Jacob's Chuck vertically during tightening and ensure there is no axial play in the assembly (Figures 132 and 133).

Place Backup Milling Assembly into a standard surgical drill.

Caution: The use of a reamer/wire driver is not recommended. Ensure the standard surgical drill/ Jacob's Chuck can achieve 750-25,000 rpm. Too slow/ fast may result in poor bone preparation and/ or damage to the instruments.

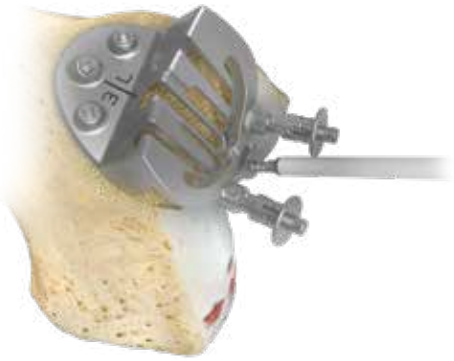

Figure 134

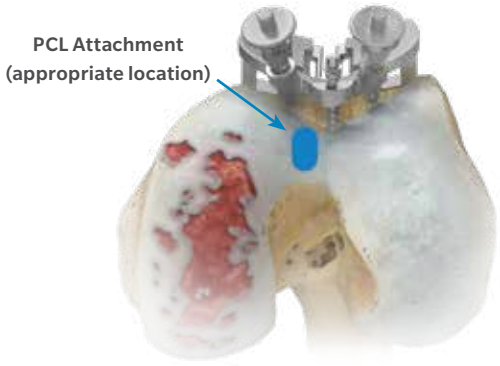

Figure 135

Secure the Milling Guide: Additional Fixation

In addition to the three (3) anterior fixation screws, it is recommended to utilize a 48mm MIS headless screw (00-5983-041-48) in the Milling Guide's posterior fixation hole when using this approach. This will help ensure adequate fixation.

Caution: Avoid tilting the sharp tip of the screw into extension and/or medially to avoid contact with the posterior cruciate ligament (Figure 134).

Caution: If a 48 mm MIS headed screw is utilized, do not tighten the screw head against the PFJ Milling Guide (Figure 135). This may result in improper resection by forcing the guide closer to the bone.

Figure 136

Figure 137

Appendix: Backup Milling Procedure Rationale (cont.)

Perform the Backup Milling Operation

Refer to pages 18-28 of this surgical technique in the Gender Solutions Patello-Femoral Joint System surgical technique for order of track milling and feet positions with the following additional instructions:

Guide the PFJ Drill Milling Adapter with a hand on the lowest portion of the standard surgical drill (Figure 136).

Caution: Drill Milling Adapter may become warm or intermittently spin during usage. Use caution when touching.

Enter the Milling Guide by placing the slotted end of the PFJ Drill Milling Adapter into the tracks similar to the approach when using the Milling Handpiece (Figure 137).

Warning: Serious injury could occur if the adapter is not fully engaged in the tracks. Initiate power only when engaged in the Milling Guide.

Proceed slowly through the milling tracks. This will reduce the potential for binding or bending of the PFJ Drill Milling Adapter and PFJ Mill Burr.

Keep the PFJ Milling Adapter perpendicular to the Milling Guide in order to minimize binding or toggle.

After milling each track (1. central, 2. lateral, 3. medial), verify that the Jacob's Chuck is properly secured to the PFJ Mill Burr shank and that the Milling Guide is rigidly fixed to the femur as loosening may occur.

Caution: To avoid over-resection, check for axial burr migration during milling and after each track is complete.

If the Jacob's Chuck interferes with the Milling Guide Foot or gets stuck in the track, ensure that the PFJ Drill Milling Adapter is perpendicular to the Milling Guide and then continue with the milling operation. Do not force.

Proceed with the remaining steps of the surgical technique.

Inspect the Milling Guide and PFJ Drill Milling Adapter for damage and replace as required.

Notes

Notes

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