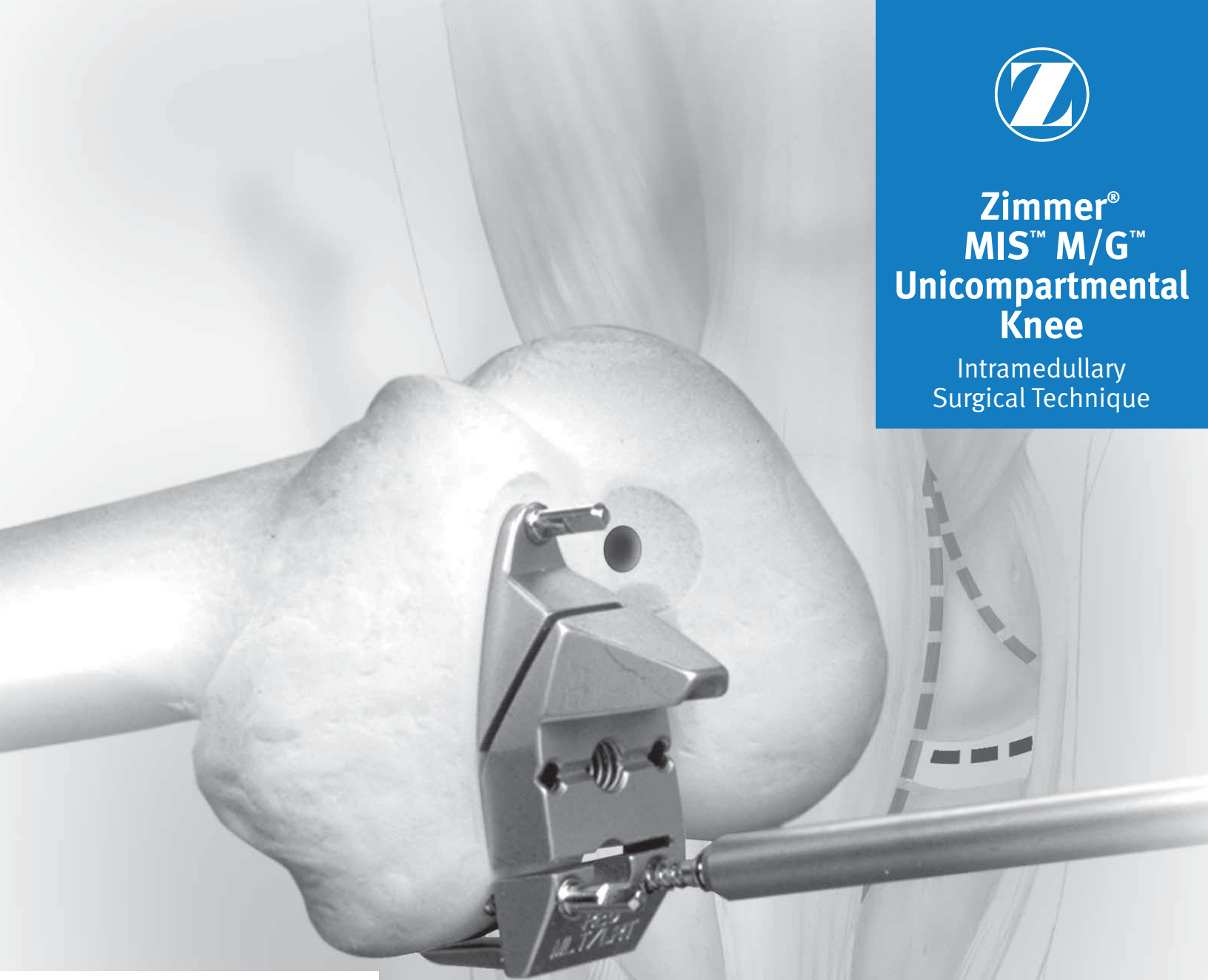
Zimmer® MIS™ M/G™ Unicompartmental Knee

Intramedullary
Surgical Technique



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M/G™ UNICOMPARTMENTAL KNEE SYSTEM

MINIMALLY INVASIVE SURGICAL TECHNIQUE USING INTRAMEDULLARY INSTRUMENTATION

SURGICAL TECHNIQUE DEVELOPED IN CONJUNCTION WITH:

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CONTENTS

INTRODUCTION

Unicompartmental knee arthroplasty (UKA) has been shown to be an effective treatment for isolated osteoarthritis affecting the medial or lateral compartment. By limiting the reconstruction to the involved compartment and retaining both cruciate ligaments, the possibility for uncompromised knee kinematics exists.

The *MIS* Intramedullary (IM) Instrumentation System for the *M/G* Unicompartmental Knee is designed to help provide an accurate, reproducible, minimally invasive technique, and eliminate many of the complexities that are inherent in some unicompartmental knee instrumentation systems. The potential results of minimally invasive techniques may include earlier mobilization, shorter hospital stays, and quicker rehabilitation.[1, 2] The system includes guides for accurate and reproducible alignment, sizing, and resection. It is designed for use with the *M/G* Unicompartmental Knee System, which has proven long-term clinical success with 95%-98% survivorship over a 6- to 10-year period.[2-4]

This guide to the surgical technique is a concise step-by-step procedure written for a medial compartment UKA. The same principles can be applied to the lateral compartment but a longer incision may be necessary. Combined with the surgeon's judgement, proper patient selection, and appropriate use of the device, this guide offers a comprehensive technique that discusses the procedure for component selection, bone preparation, trial reduction, cementing techniques, and component implantation. It is strongly recommended that the surgeon read the complete procedure for details, notes, and technique tips.

1. Kelly MA. Minimally invasive total knee arthroplasty and the unicompartmental knee. 14th Annual Vail Orthopaedics Symposium. 2000.
2. Argenson JN, Chevrol-Benkeddache Y, Aubaniac JM. The case for minimal invasive unicompartmental knee arthroplasty. A retrospective analysis of 160 cases. 69th Annual Meeting of the American Academy of Orthopaedic Surgeons, 2002.
3. Berger RA, Nedeff DD, Barden RM, et al. Unicompartmental knee arthroplasty: Clinical experience at 6- to 10-year follow up. *Clin Orthop*. 1999;367:50-60.
4. Argenson JN, Chevrol-Benkeddache Y, Aubaniac JM. Modern cemented metal-backed unicompartmental knee arthroplasty: a 3 to 10 year follow-up study. 68th Annual Meeting of the American Academy of Orthopaedic Surgeons, 2001.

RATIONALE

The basic goals of unicompartmental knee arthoplasty are to restore lower extremity alignment and replace damaged articular surfaces. Another goal is to create a mechanical axis that is close to neutral to help avoid overloading the contralateral condyle, with the joint line parallel to the floor and perpendicular to the mechanical axis. The femoral and tibial components are oriented perpendicular to this mechanical axis.

The alignment goals for unicompartmental arthroplasty differ from those that are customary in high tibial osteotomy (HTO) where overcorrection is desirable to displace the weight-bearing forces away from the diseased compartment. In contrast, when re-establishing limb alignment in a unicompartmental procedure, **it is particularly important to avoid overcorrection of the limb** as this will increase the stress in the contralateral compartment and heighten the potential for cartilaginous breakdown. Studies of unicompartmental procedures have shown that slight undercorrection of the limb alignment correlates to long-term survivorship.[5] This suggests, for example, that a knee deformity of 8° might be corrected by 6°-8°, but never more than 8°.

Well-designed instruments allow accurate cuts to help assure secure component fixation. A wide selection of component sizes allows restoration of soft tissue tension with limited or no soft tissue release.

Templating the preoperative x-ray film assists with proper femoral component alignment. On the femoral x-ray film, a line is drawn from the center of the femoral head to the center of the knee. The femoral anatomic axis is drawn down the center of the femoral medullary canal to the center of the knee. By referencing the angle formed by these two lines, and using an IM Femoral Resection Guide in the femoral canal to reproduce the anatomic axis, the distal femur can be cut perpendicular to the mechanical axis.

In the frontal plane, the proximal tibia is cut perpendicular to the mechanical axis using a cutting guide to help facilitate accurate tibial resection. In the sagittal plane, the cutting guide helps create a tibial resection that is sloped 7° posteriorly. Parallel distal femoral and proximal tibia cuts allow proper alignment for implant insertion.

Minimizing Soft Tissue Disruption

By minimizing soft tissue disruption, the surgeon can minimize some of the factors that impede patient recovery. This may result in shorter hospital stays and facilitate rehabilitation.

The technique accomplishes this in a number of ways. For example, the entire surgical exposure is distal to the vastus medialis making it unnecessary to divide the muscle. This helps minimize postoperative pain and may reduce the time required for the resumption of the activities of daily living.

Additionally, smaller instrumentation allows the surgeon to operate without everting the patella. This may also reduce postoperative pain and allow faster quadriceps control, since disruption to the extensor mechanism is minimal.

5. Cartier P, Seinouiller JL, Grelsamer RP. Unicompartmental knee arthroplasty: 10-year minimum follow-up period. *J Arthroplasty.* 1996;11(7):782-788.

PREOPERATIVE PLANNING

Take standing weight-bearing A/P and lateral films of the knee and a skyline radiograph of the patella. Then take a long-standing A/P radiograph showing the center of the femoral head, the knee, and as much of the tibia as possible (preferably including the ankle). Alternatively, a single A/P radiograph of the entire femur allows correct calculations and can be made on a 35cm x 42cm (14 x 17-inch) film.

On the x-ray film, draw a line from the center of the femoral head to the center of the distal femur at the knee. Draw a second line down the middle of the distal femoral shaft (Fig.1) in the area where the IM Femoral Resection Guide will be used to reproduce the anatomic axis of the femur. The angle between the mechanical axis line and the anatomic axis line is usually 6°.

The IM Femoral Resection Guide has been designed to reference the anatomic axis. After the angle between the mechanical and anatomic axis is determined, cut the distal femoral condyle using the Distal Femoral Resector Block. This cut is determined by the templating procedure described above, it is usually approximately 6°. In UKA, the angle of the distal cut (Fig. 2) does not affect varus/valgus limb alignment. It is the difference between the mechanical and anatomic axis and sets the contact point of the femoral component on the tibia. The goal is to produce a parallel relationship between the distal femoral cut and the proximal tibial resection.

The resection guide allows for a choice of four angles (2°, 4°, 6°, or 8°). Occasionally, in patients who have had total hip arthroplasty with a femoral component that has more valgus in the neck shaft angle than usual, or in the patient with coxa valga, the angle between the mechanical axis and anatomic axis may be 4°, or even 2°. The rare patient with significant coxa vara or a broad pelvis with long femoral necks may have an angle of 8°.

No calculations for the tibia are necessary. The center of the proximal tibia and the center of the ankle are determined visually. The proximal portion of the cutting guide is centered in the medial third of the tibial tubercle just medial to the midpoint. The distal portion is positioned at the ankle with the tip pointing to the second metatarsal. The proximal tibia is then cut perpendicular to the line between these two points.

Fig. 1

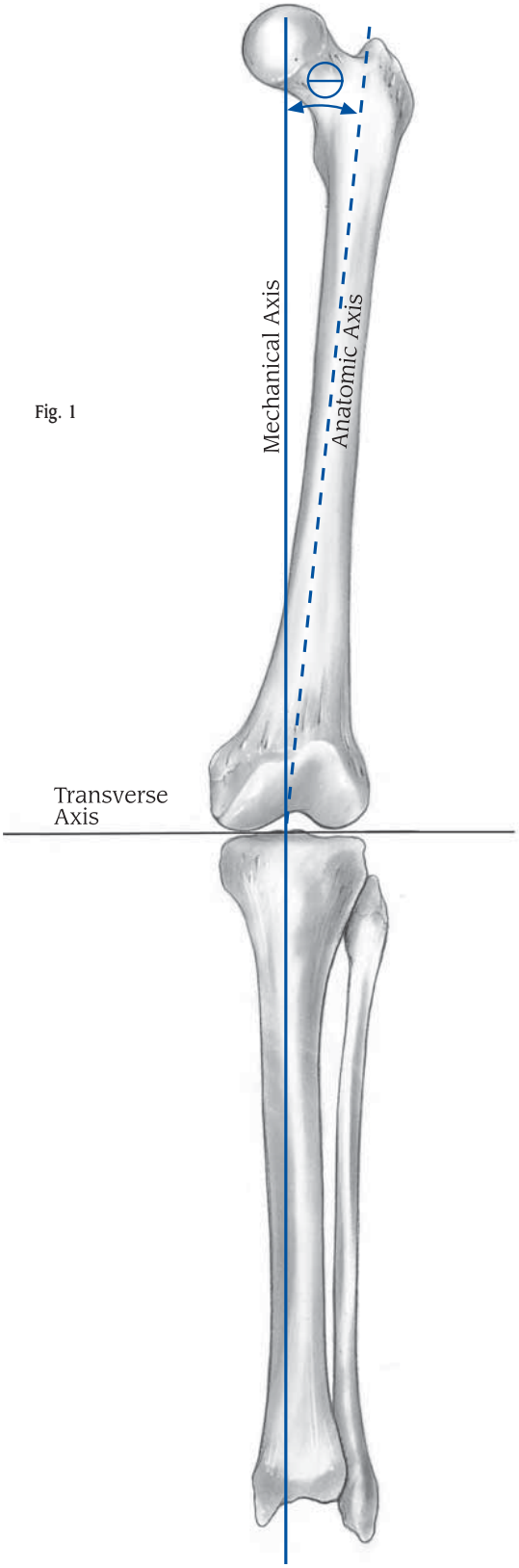
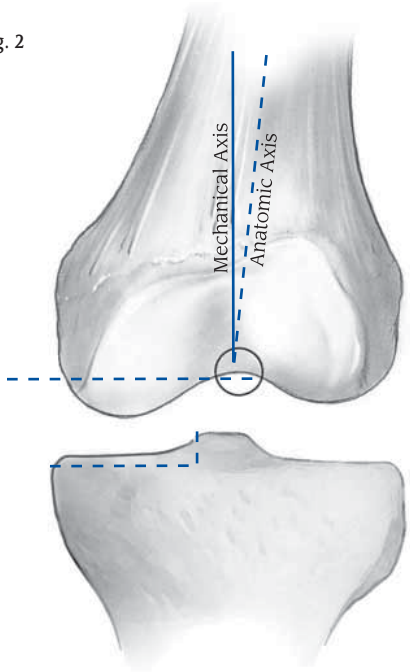

Mechanical Axis
Anatomic Axis
Transverse Axis

Fig. 2


Mechanical Axis
Anatomic Axis

SURGICAL PROCEDURE

With the patient in the supine position, flex the hip 70°-90° and the knee approximately 120°, and place the leg in a stabilizer. Flexion of 120° is necessary to insert the components. If unable to achieve 120° of flexion, a larger incision may be necessary to create sufficient exposures. Wrap the ankle area with an elastic wrap. Do not place bulky drapes on the distal tibia, ankle, or foot. A bulky drape in this area will make it difficult to locate the center of the ankle, and will displace the Tibial Resector, which may cause inaccurate cuts.

STEP ONE

EXPOSE THE JOINT

The incision can be made with the leg in flexion or extension depending on surgeon preference. Make an anteromedial longitudinal skin incision beginning slightly above the midline of the patella and extending it approximately 7-12cm down to the base of the tibial tubercle (Fig. 3).

Incise the medial joint capsule along the medial border of the patella with a scapel. Begin this incision approximately at the superior pole of the patella, this incision can be carried proximally or distally, avoid the vastus medialis, and extend it to approximately 3cm below the joint line (Fig. 4). Excise the synovium, fat pad, and meniscal remnant to facilitate visualization.

If desired, make an additional transverse or oblique linear incision in the medial capsule just distal to the vastus medialis. This will create a T-incision in the capsule that is approximately 10cm x 1.5cm.

Do not release other soft tissue unless specifically indicated.

Debride the joint and inspect it carefully. Remove intercondylar osteophytes to avoid impingement with the tibial spine or cruciate ligament. Also remove peripheral osteophytes that interfere with the collateral ligaments and capsule. With the medial compartment disease, osteophytes are commonly found on the lateral aspect of the tibial eminence. Protect healthy cartilage with a moist sponge or cloth.

Inspect the patellofemoral joint, the lateral compartment and the ACL at varying degrees of flexion. If significant cartilage damage is present, a total knee arthroplasty should be considered.

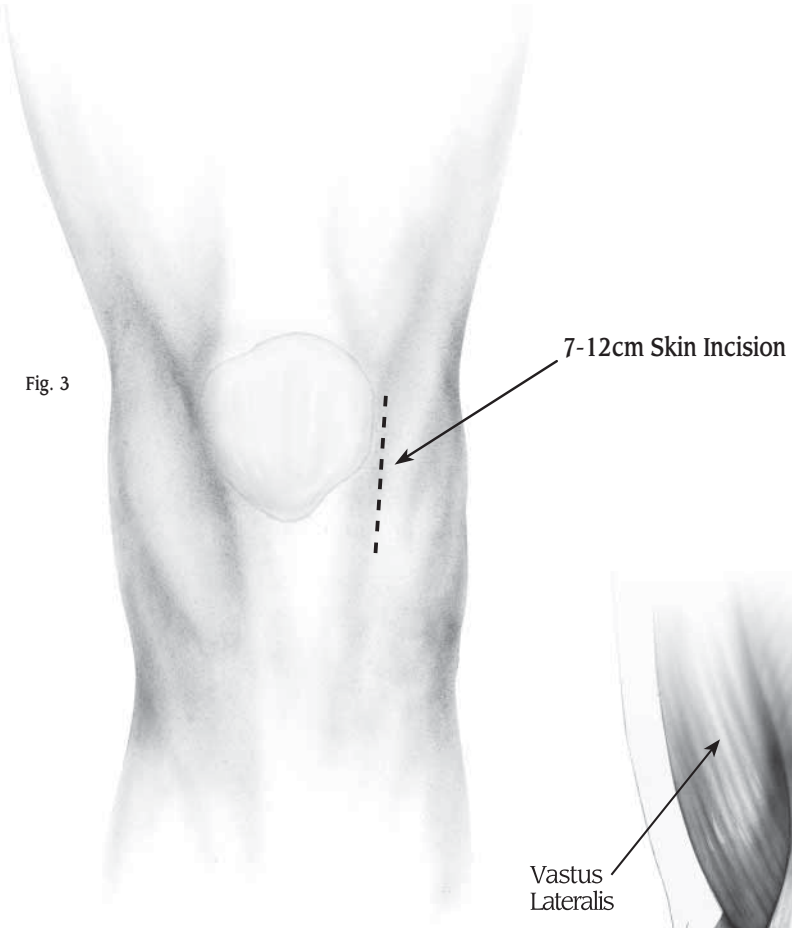

7-12cm Skin Incision

Fig. 3

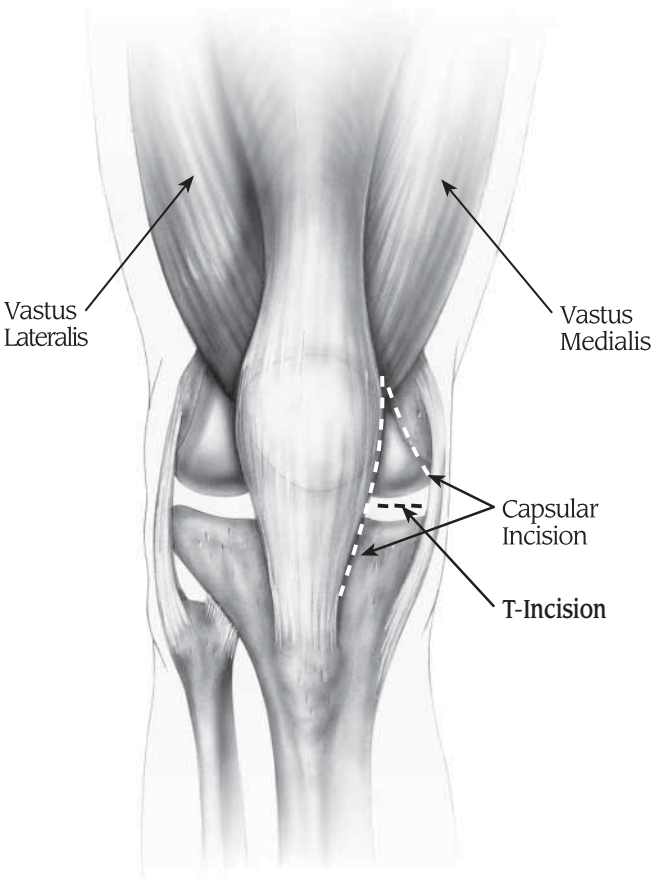

Vastus
Lateralis
Vastus
Medialis
Capsular
Incision
T-Incision

Fig. 4

STEP TWO

DRILL HOLE IN DISTAL FEMUR

With the knee flexed 20°- 30° (without everting the patella), move the patella laterally and choose the site for inserting the IM Femoral Resection Guide approximately 1cm anterior to the origin of the posterior cruciate ligament and just anterior to the intercondylar notch in the distal femur. Use the 8mm Femoral IM Drill or an awl to create the hole for the guide. In drilling this hole, it is important to parallel the shaft of the femur in both the A/P and lateral projections (Fig. 5). Only the cancellous bone of the distal femur should be drilled. Suction the canal to remove intramedullary fat. This will reduce IM pressure during the placement of subsequent guides.

The hollow diaphysis offers little resistance to the insertion of the intramedullary rod of the resection guide. IM Femoral Resection Guides are available for LT. MED/RT. LAT or RT. MED/LT. LAT, with two different rod lengths. The standard length is 23cm (nine inches) long and provides the most accurate reproduction of the anatomical axis. If the femoral anatomy is altered, as in a femur with a long-stem total hip femoral component, or with a femoral fracture malunion, then use the optional resection guide with a 10cm (four-inch) rod.

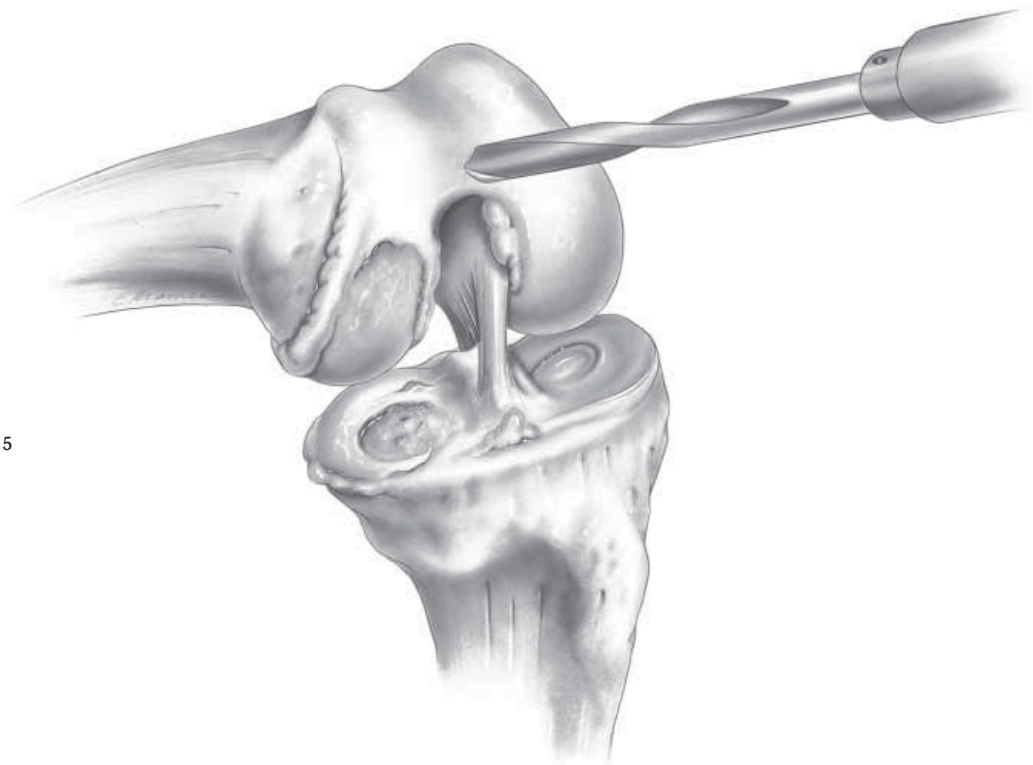


Fig. 5

Using the Universal Handle, insert the appropriate IM Femoral Resection Guide into the femur (Fig. 6). Control the rotation of the guide as it approaches the articular surface of the femur. The posterior edge of the guide should be parallel to the tibial articular surface (perpendicular to the tibial shaft) (Fig. 7). The goal is to be parallel to the cut surface of the tibia after the tibial cut is made. Flex or extend the knee as necessary to properly position the guide. **Make sure that the surface of the resection guide is flush with the condyles and no soft tissue is impinged.** Predrill and place a holding pin on the posterior flange of the IM Femoral Resection Guide.

Fig. 6

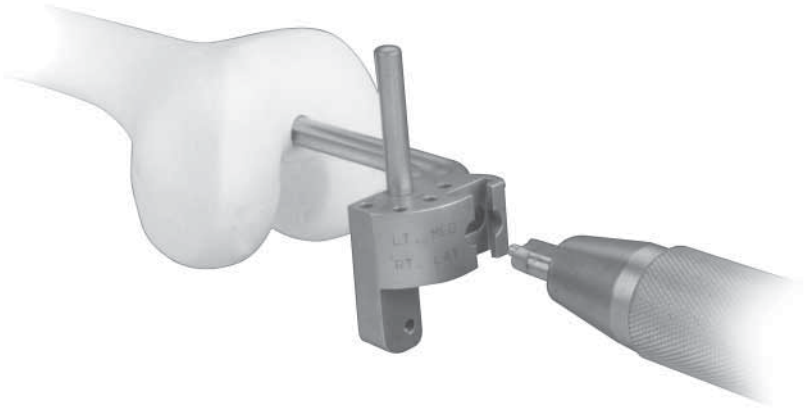
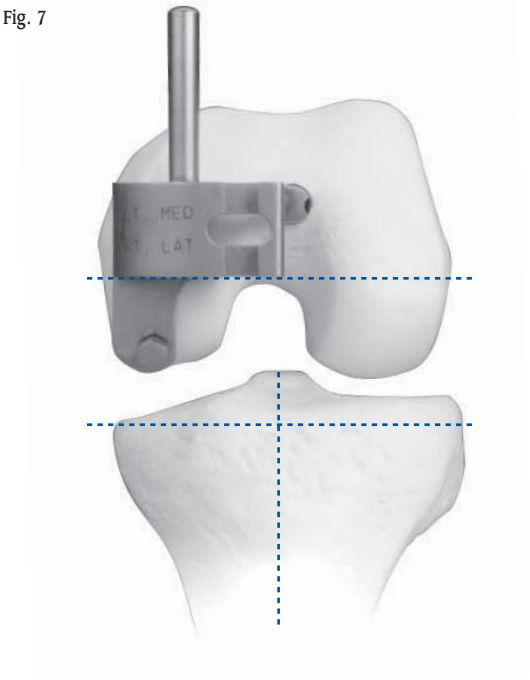


Fig. 7



STEP THREE

CUT THE DISTAL FEMORAL CONDYLE

Make sure that the IM Femoral Resection Guide is contacting the distal femur and that the soft tissue is protected. Not fully seating this guide could cause insufficient resection of the distal femur.

There are two Distal Femoral Resector Blocks. The silver block is for medial compartment resection. The gold block is for lateral compartment resection. Choose the appropriate Distal Femoral Resector Block.

With the engraving that corresponds to the compartment to be resected facing up (RIGHT MED, LEFT MED, RIGHT LAT or LEFT LAT), slide the correct Distal Femoral Resector Block over the anterior post of the anterior resection guide until the edge of the block contacts the distal femur.

Observe the numbered angle-setting holes on the anterior surface of the block and select the appropriate angle as determined by preoperative radiographs. Insert a Slotted Holding Pin through the appropriate hole in the Distal Femoral Resector Block (Fig. 8). Mate it with the same numbered hole in the IM Femoral Resection Guide. This locks the angle and prevents movement of the resector block. Please note that if a pin is used for fixation, impingement may occur with the saw blade. The distal cut may be started with the pin in place, but the pin should be removed before contact with the blade occurs.

Use a narrow, 0.050-inch/1.27mm oscillating or reciprocating blade to cut the distal portion of the condyle through the slot of the Distal Femoral Resector Block (Fig. 9).

Fig. 8

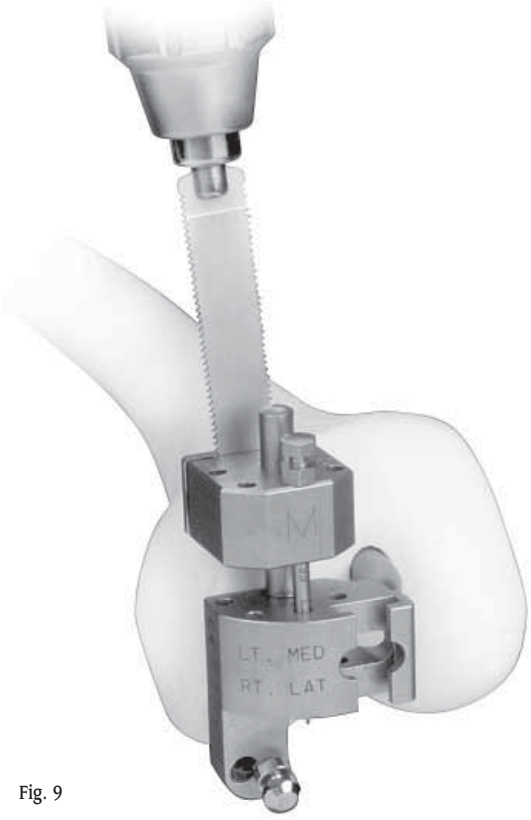


Fig. 9

The amount of articular cartilage and bone removed will be replaced by the femoral component. Having the IM Femoral Resection Guide flush against the medial femoral condyle will help the surgeon obtain the proper thickness of bone to be resected.

After removing the IM Femoral Resection Guide and Distal Femoral Resector Block, check the flatness of the distal femoral condyle cut with a flat surface. If necessary, modify the cut surface of the distal condyle so that it is completely flat. **This is extremely important for the placement of subsequent guides and for proper fit of the implant.** Use a file to smooth any bony prominences that remain and to contour the peripheral edge of the femur to restore anatomic shape (Figs. 10 & 11).

Fig. 10

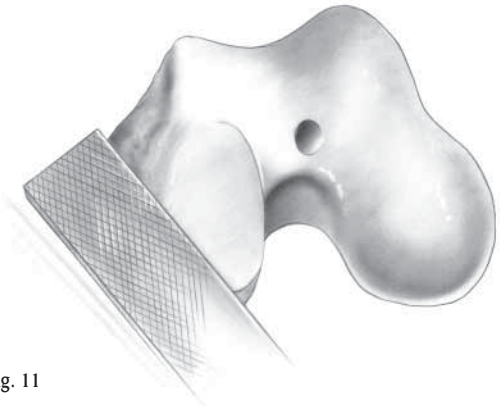


Fig. 11

Insert the IM Patella Retractor into the intramedullary hole (Fig. 12).

Fig. 12

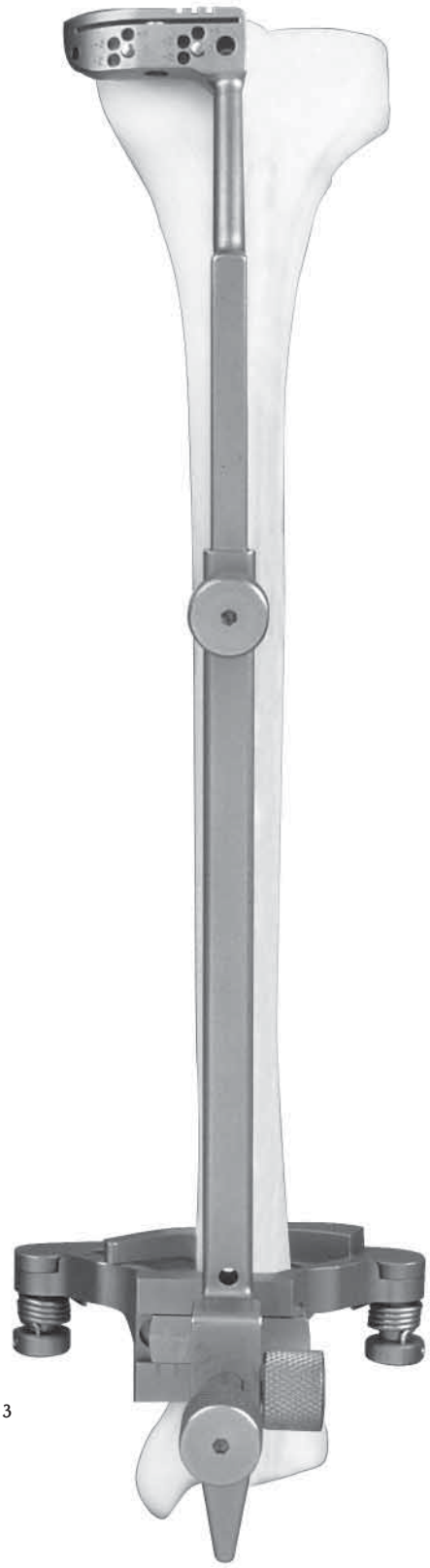


Fig. 13

STEP FOUR

CUT THE TIBIA

This technique is written to cut the tibia after cutting the distal femur. The surgeon may choose to finish the femoral cuts first. Refer to page 16 of this guide if this option is preferred.

The *M/G* Unicompartmental Tibial Component is designed for an anatomic position with 7° of posterior tilt. It is important that the cut be made accurately. Positioning of the Tibial Resector is crucial; the rod of the Tibial Resector should be medial to the tibial tubercle (Fig. 13), and parallel to the axis of the tibial shaft.

Surgical Tip:

If the patient has a slight flexion contracture, cutting less posterior tilt may help since less posterior slope means more bone resection anteriorly than posteriorly thereby opening the extension gap more relative to the flexion gap. This can be accomplished by moving the rod of the Tibial Resector closer to the leg. Check the depth and angle of resection with the Resection Guide.

Adjust the telescoping rod to the approximate length of the tibia and turn the knob on the shaft of the rod to temporarily maintain the length. The foot of the rod should be positioned about 5mm-10mm medial to the midpoint between the palpable medial and lateral malleoli. The tip should point to the second metatarsal. Secure the distal portion of the instrument by placing the spring arms of the ankle clamp around the ankle.

Loosen the knob in the middle of the Tibial Resector shaft. Position the top of the instrument proximal to the tibial tubercle with the cutting slot at the approximate desired level of resection.

The longitudinal axis of the rod will usually lie just medial to the midpoint of the tibial tubercle and be centered over the intercondylar eminence.

In the sagittal plane, align the rod so it is parallel to the anterior tibial shaft by using the slide adjustment at the distal end of the rod. Tighten the knob for the adjustment. If there is a bulky bandage around the ankle, adjust the rod to accommodate the bandage. This will help in cutting the tibia in the proper slope.

Use the **2mm** tip of the Tibial Depth Resection Gauge to help achieve the desired depth of cut. Insert the gauge into the hole on the top of the Tibial Resector. The arm of the gauge should rest in the deepest defect in the tibia (Fig. 14). This indicates a cut that will remove 2mm of bone below the tip of the gauge. When the depth is set, tighten the knob on the shaft.

Use the Universal Resection Guide to check that the sagittal cut will be properly rotated and located as close to the tibial spine as possible without cutting or harming the anterior cruciate ligament (Fig. 15).

Fig. 14

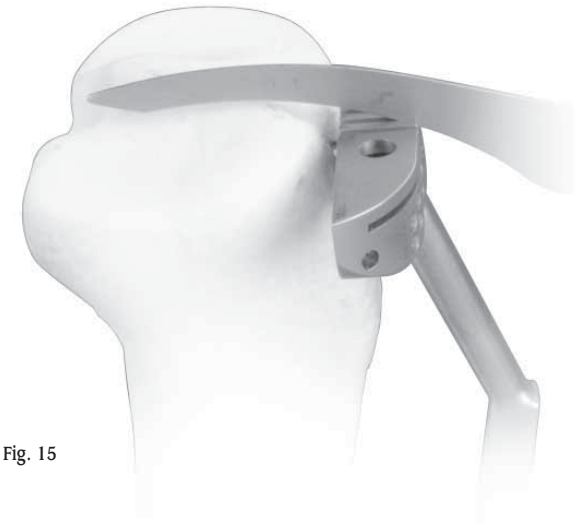


Fig. 15

Secure the cutting platform of the resector to the proximal tibia by inserting a Headless Holding Pin or 48mm Headless Holding Screw into each of the two holes marked "0" on the resector (Fig. 16). Use electrocautery or the reciprocating saw to score the tibial surface where the sagittal cut will be made. Check this point both in extension and flexion.

After inserting the first Headless Holding Pin in the Tibial Resector (0), place a Concave Tibial Spacer (flat side down) on the top surface of the resector (Fig. 17). Check the varus/valgus alignment relative to the tibial axis of the limb, and the posterior slope of the tibial resection then place the second holding pin.

Fig. 16

Fig. 17

If desired, the depth of cut can be verified by inserting the Tibial Depth Resection Gauge again. If the gauge indicates that the resection will not be deep enough, remove the proximal portion of the resector and reinsert it over the Headless Holding Pins using the holes marked +2, +4, or +6. This will remove an additional 2mm, 4mm, or 6mm of bone. Once the tibial resection has been determined, use a Hex-head Holding Pin or Silver Spring Pin to further stabilize the guide (Fig. 18).

Insert a retractor medially to protect the medial collateral ligament. Use a reciprocating saw to make the sagittal cut (Fig. 19). Then use the slot of the resector to cut the upper surface of the tibia flat. If the first cut of the proximal tibia is not deep enough, adjust the level of the cut by using the +2, +4, or +6 holes as indicated above. Remove the Tibial Resector when the tibial preparation is complete. If necessary, a second sagittal cut can be made to allow for optimal coverage with the next larger size tibial base plate.

Fig. 18

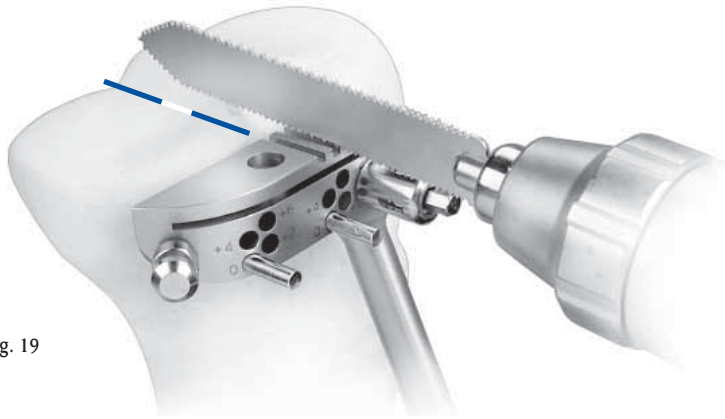


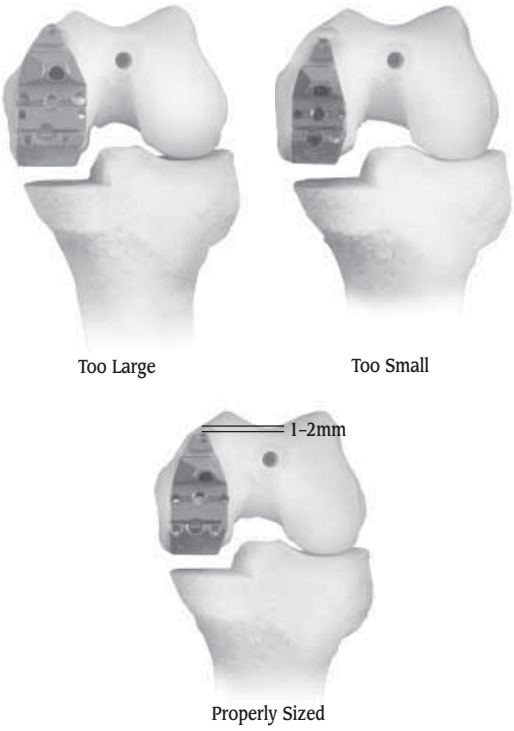
Fig. 19

STEP FIVE

FINISH THE FEMUR

There are seven sizes of femoral implants and corresponding sizes of Femoral Sizer/Finishing Guides. Thread the T-handle into the appropriate left or right Femoral Sizer/Finishing Guide and tighten it securely. Then insert the foot of the guide into the joint and rest the flat surface of the guide against the cut distal condyle. Pull the foot of the guide superiorly against the cartilage/bone of the posterior condyle. Leave 1mm-2mm of exposed bone above its anterior edge (Fig. 20).

Fig. 20



Too Large

Too Small

Properly Sized

The outside contour of these guides matches the contour of the implant except where the guide has been relieved to provide space for the patella. Repeat with additional guides until the proper size is selected. If the condyle appears to be between two sizes, choose the smaller size. This helps prevent the patella from impinging on the prosthesis.

Note: Be sure that there is no soft tissue between the Femoral Sizer/Finishing Guide and the cut distal condyle. It is important that the Femoral Sizer/Finishing Guide sits flush against the bone. ***Any gaps between the guide and the bone will compromise the accuracy of the cuts and, subsequently, component fit may be compromised.***

Surgical Tip

Use electrocautery to mark the bone anterior/superior to the distal cut just above where the center of the Femoral Sizer/Finishing Guide is positioned. This mark can be used as a reference to help ensure that the guide remains in the desired position. This mark can be checked both in flexion and extension referenced to the tibial cutting surface.

The following order is recommended to maximize the stability and fixation of the Femoral Sizer/Finishing Guide. This will help ensure that the cuts and holes are precise.

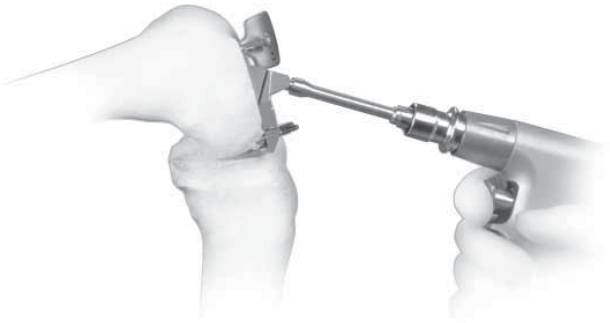
1. Flex the knee to 90°. With the proper size Femoral Sizer/Finishing Guide in position, insert a 48mm Headed Screw into the top pin hole, or predrill and insert a Holding Pin. Rotate the guide into the proper position by centering the posterior aspect over the cut tibial surface. The Femoral Sizer/Finishing Guide should be parallel to the long axis of the tibia. Leave 1mm-2mm of exposed bone around the peripheral edge.
2. Insert two 27mm Headed Screws into the lower pin holes, or predrill and insert Short-head Holding Pins. This allows all of the preparations to be made with the screws/pins in place (Fig. 21).

Fig. 21

Note: If adequate fixation of the Femoral Sizer/ Finishing Guide cannot be accomplished using the posterior holes due to inadequate bone, one or more screws or pins may be inserted into the holes in the middle of the Femoral Sizer/Finishing Guide. If the holes in the middle of the guide are used, it will be necessary to remove the Femoral Sizer/ Finishing Guide before finishing the femoral cuts.

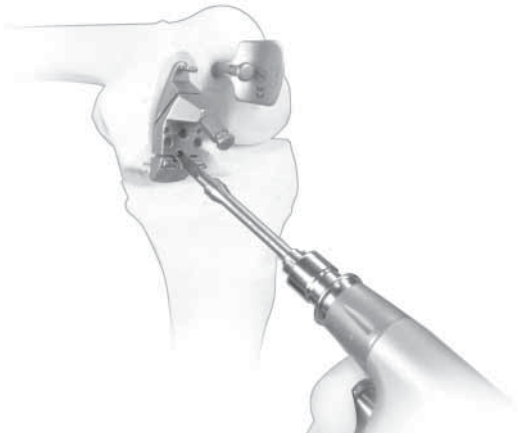
3. Insert the drill bit into the anterior post hole, and orient it to the proper angle (Fig. 22). Do not attempt to insert or align the drill bit while the drill is in motion. When the proper alignment is achieved, drill the anterior post hole and, if necessary, insert a Femoral Holding Peg.

Fig. 22



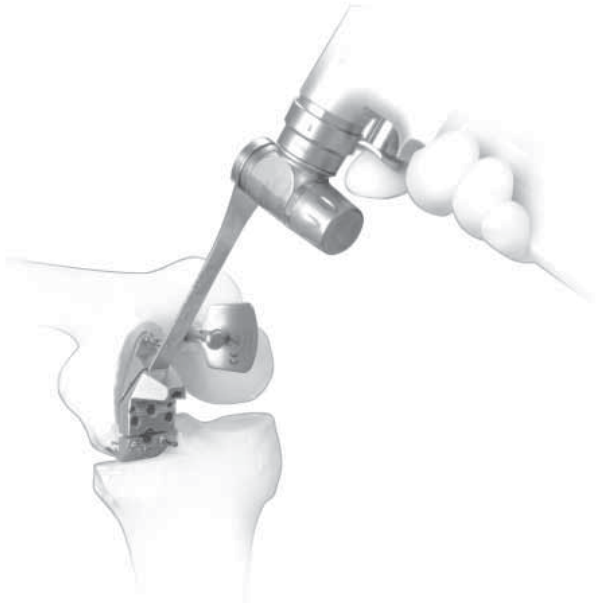
4. Drill the posterior post hole in the same manner. This hole is angled the same as the anterior post hole (Fig. 23).

Fig. 23



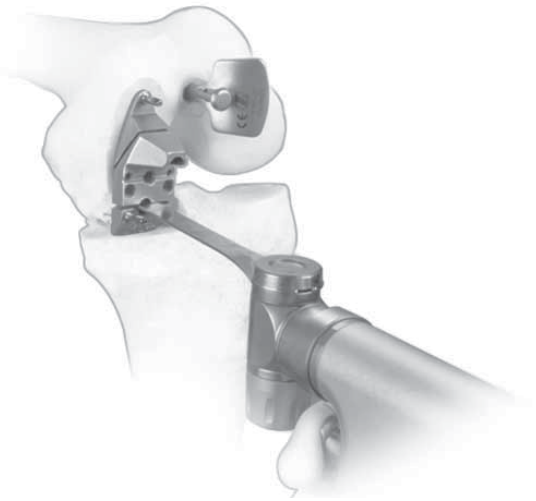
5. Remove the anterior Femoral Holding Peg and cut the posterior chamfer until the saw blade almost contacts the 27mm screw(s) or holding pin(s) (Fig. 24).

Fig. 24



6. Cut the posterior condyle (Fig. 25).

Fig. 25



7. Remove the screws/pins and the Femoral Sizer/Finishing Guide, and finish any uncut bone.
8. Ensure that all surfaces are flat. Remove any prominences or uncut bone.

Debride the joint and inspect the posterior condyle. Then resect the posterior corner of the femur and make sure that no soft tissue is impinged. **If any prominent spurs or osteophytes are present, especially in the popliteal area of the posterior femoral condyle, remove them with an oscillating saw or an osteotome, as they could inhibit flexion** (Fig. 26).

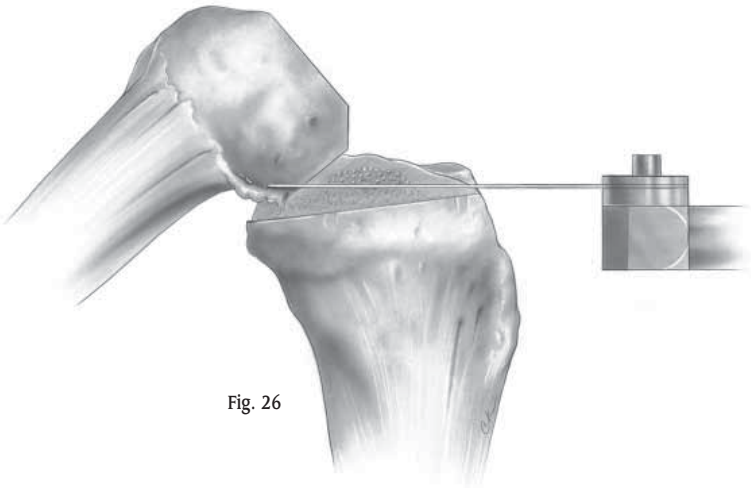


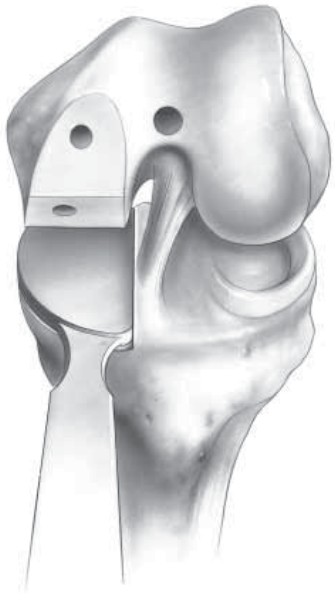
Fig. 26

STEP SIX

FINISH THE TIBIA

Resect the remaining meniscus and remove any osteophytes, especially those interfering with the collateral ligament. Place the Tibial Sizer on the cut surface of the tibia with the straight edge against the surface created by the sagittal cut. Verify the proper rotation of the sagittal cut in the transverse plane. The rotation is correct when the handle of the Tibial Sizer is 90° to the coronal plane (Fig. 27). Select the Tibial Sizer that best covers the resected proximal tibia in both the A/P and M/L dimensions. If desired, use the resected tibial bone fragment as an aid in sizing.

Fig. 27



Be sure that the sizer rests on cortical bone around its entire perimeter without overhanging to provide the implant with strong cortical support. Remove the Tibial Sizer. Then remove all soft tissue debris from the popliteal region.

Surgical Tip:

To facilitate insertion of the Tibial Fixation Plate Provisional, externally rotate the flexed tibia.

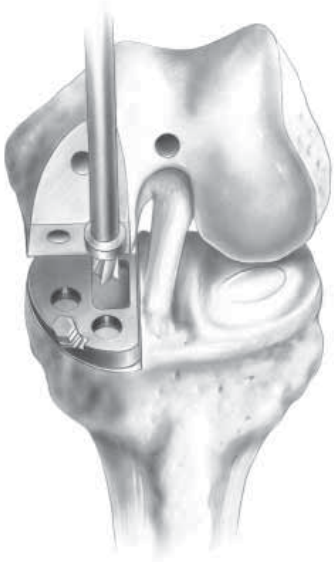
Place the corresponding size Tibial Fixation Plate Provisional onto the cut surface of the tibia. Insert the Tibial Plate Impactor into the recess on the provisional and impact it so the central fin engages the bone and the provisional sits flush on the tibial surface (Fig. 28). Insert a 27mm Headed Screw in the anterior fixation hole or predrill and insert a Short-head holding pin.

Fig. 28

Use the Tibial Peg Drill to drill the two tibial post holes (Fig. 29). Note that these holes are angled 20° posteriorly to facilitate drilling. Although the posts on the implant are at 90°, the drill is designed so that the posts will fit into these angled holes.

Leave the Tibial Fixation Plate Provisional in place on the bone.

Fig. 29



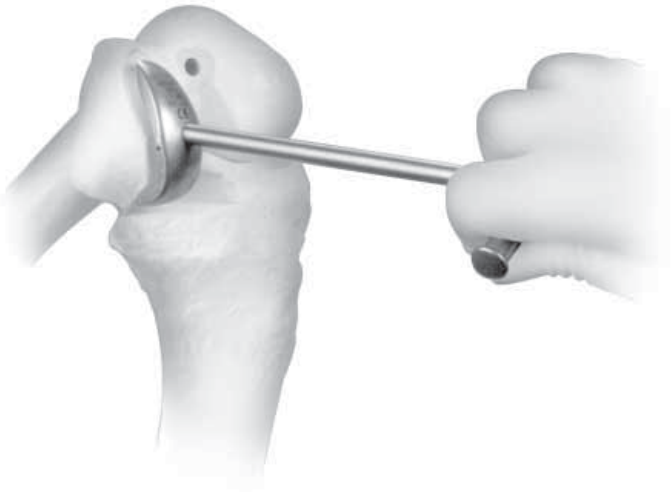
STEP SEVEN

PERFORM TRIAL REDUCTION

Remove the Patellar Retractor. With all bone surfaces prepared, perform a trial reduction with the appropriate size Provisional Femoral Component, Tibial Fixation Plate Provisional, and Tibial Articular Surface Provisional. The Concave Tibial Spacer can be used in place of the combined Tibial Fixation Plate Provisional and Tibial Articular Surface Provisional.

Thread the T-handle onto the Provisional Femoral Component and tighten it securely (Fig. 30). To help guide the femoral provisional past the patella, place the leg in deep flexion to begin the insertion. Insert the first long post. Then adjust the leg to a midflexion position, rotating the provisional around and in back of the patella. Reposition the leg in deep flexion to complete the insertion.

Fig. 30



Impact the provisional onto the femur with a mallet.

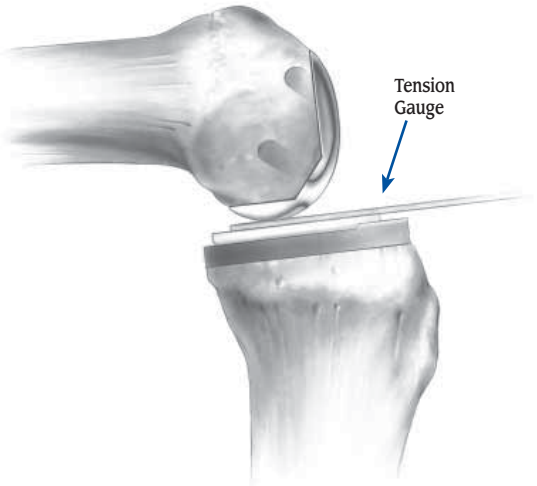
The holding pin or 27mm headed screw must be removed before inserting the Tibial Articular Surface Provisional.

If necessary, perform minor trimming of bone surfaces.

With all trial components in place, check for proper range of motion and ligament stability. The femoral component should sit in the middle of the tibial component in flexion and extension. If it does not, reorient the femoral component before proceeding.

The Tibial Articular Surface Provisional or Concave Tibial Spacer used should permit full flexion and full extension. Overstuffing should be avoided, as this will transfer stress to the contralateral compartment. Evaluate soft tissue tension in flexion and extension. Use the 2mm end of the Tension Gauge to help ensure that flexion and extension gaps are not too tight (Fig. 31).

Fig. 31



The correct thickness of the prosthesis is one that fills the joint space, but which is not so tight that it causes excessive stress on the collateral ligaments. As a rule, the correct prosthesis should allow the joint space to be opened approximately 2mm when a stress is applied, with the knee in full extension and without soft tissue release. The knee must also be tested in 90° flexion to allow a 2mm flexion gap. Excessive flexion tightness will prevent postoperative flexion and may cause the tibial prosthesis to lift up anteriorly as the femoral component rolls posteriorly on the tibial component. If flexion tightness is present, try using a thinner tibial articular component or increasing the posterior slope of the tibial resection.

Surgical Tip

The Tension Gauge is used to help balance the unicompartmental knee in both flexion and extension. With the knee flexed 90°, position the 2mm end of the Tension Gauge between the Provisional Femoral Component and the Concave Tibial Spacer. This should be a snug, but not an overly tight fit. The same test is used with the knee in full extension.

STEP EIGHT

IMPLANT FINAL COMPONENTS

When Using a Metal-backed Tibial Component

Obtain the final sterile components and implant the tibial base plate first. To facilitate insertion, externally rotate the flexed tibia. If desired, place a moist, sterile gauze sponge behind the tibia before implanting the component to help collect excess cement behind the tibia.

Surgical Tip

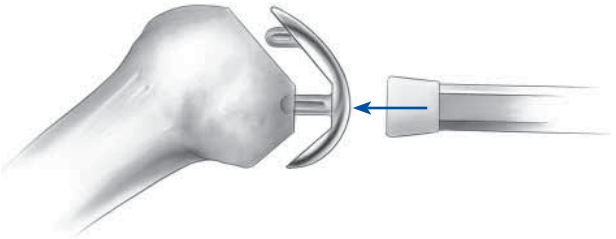
With the modest amount of bone removed, particularly from the tibia, there may be a sclerotic cut surface. If the resected surfaces of the tibia and/or femur are sclerotic, drill multiple holes with a 3.2mm drill to improve cement fixation.

Apply cement and press the tibial base plate onto the tibia.

1. Position and press down the posterior portion of the component.
2. Press the anterior portion of the component, expressing excess cement anteriorly.
3. Remove the sterile gauze sponge from behind the joint.
4. Use a cement removal device to remove any excess cement.

Apply cement and begin the femoral component insertion with the leg in deep flexion. Insert the long post first. Adjust the leg to a midflexion position, rotating the implant around and in back of the patella. Then reposition the leg in deep flexion to complete the insertion (Fig. 32).

Fig. 32

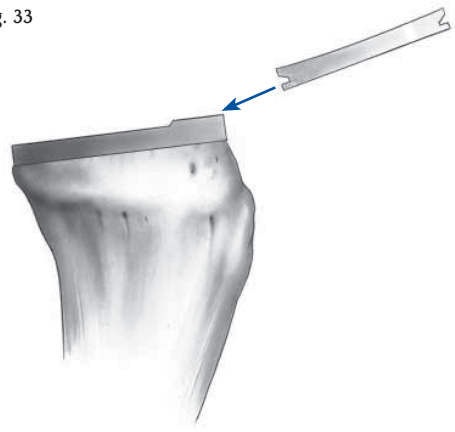


Choose the correct size and thickness of the final tibial articular surface by testing with the Tibial Articulating Surface Provisionals in maximum flexion and extension. Use the Tension Gauge to assess the flexion and extension gaps. Recheck alignment to verify that the joint has not been overcorrected.

After applying cement and inserting the components, insert the Tension Gauge between the components and extend the knee to apply pressure until the cement is sufficiently cured.

Remove any remaining excess cement before the final placement of the tibial articular surface. With the engraved side down, slide the edge of the polyethylene component under the posterior lip of the base plate on the side opposite the spring. Then press down to snap the component into place (Fig. 33). The spring will lock the articular surface securely in place.

Fig. 33



When Using an All-Polyethylene Tibial Component

Obtain the final sterile components and implant the all-polyethylene tibial component first. To facilitate insertion, externally rotate the flexed tibia. If desired, place a moist, sterile gauze sponge behind the tibia before implanting the component to help collect excess cement behind the tibia.

Surgical Tip

With the modest amount of bone removed, particularly from the tibia, there may be a sclerotic cut surface. If the resected surfaces of the tibia and/or femur are sclerotic, drill multiple holes with a 3.2mm drill to improve cement fixation.

Apply cement and press the all-polyethylene component onto the tibia.

1. Position and press down the posterior portion of the component.
2. Press the anterior portion of the component, expressing excess cement anteriorly.
3. Remove the sterile gauze sponge from behind the joint.
4. Use a cement removal device to remove any excess cement.

Note: It is important not to use the Tibial Plate Impactor to impact the all-polyethylene tibial component.

Apply cement and begin the femoral component insertion with the leg in deep flexion. Insert the long post first. Adjust the leg to a midflexion position, rotating the implant around and in back of the patella. Then reposition the leg in deep flexion to complete the insertion.

Use the Tension Gauge to assess the balance of the flexion and extension gaps.

After applying cement and inserting the components, insert the Tension Gauge between the components and extend the knee to apply pressure until the cement is sufficiently cured.

CLOSURE

Irrigate the knee for the final time and close. Assure all excess cement has been removed prior to closing. Cover the incision with sterile dressing and wrap the leg with an elastic bandage from the toes to the groin.

Please refer to package insert for complete product information, including contraindications, warnings, precautions, and adverse effects.

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