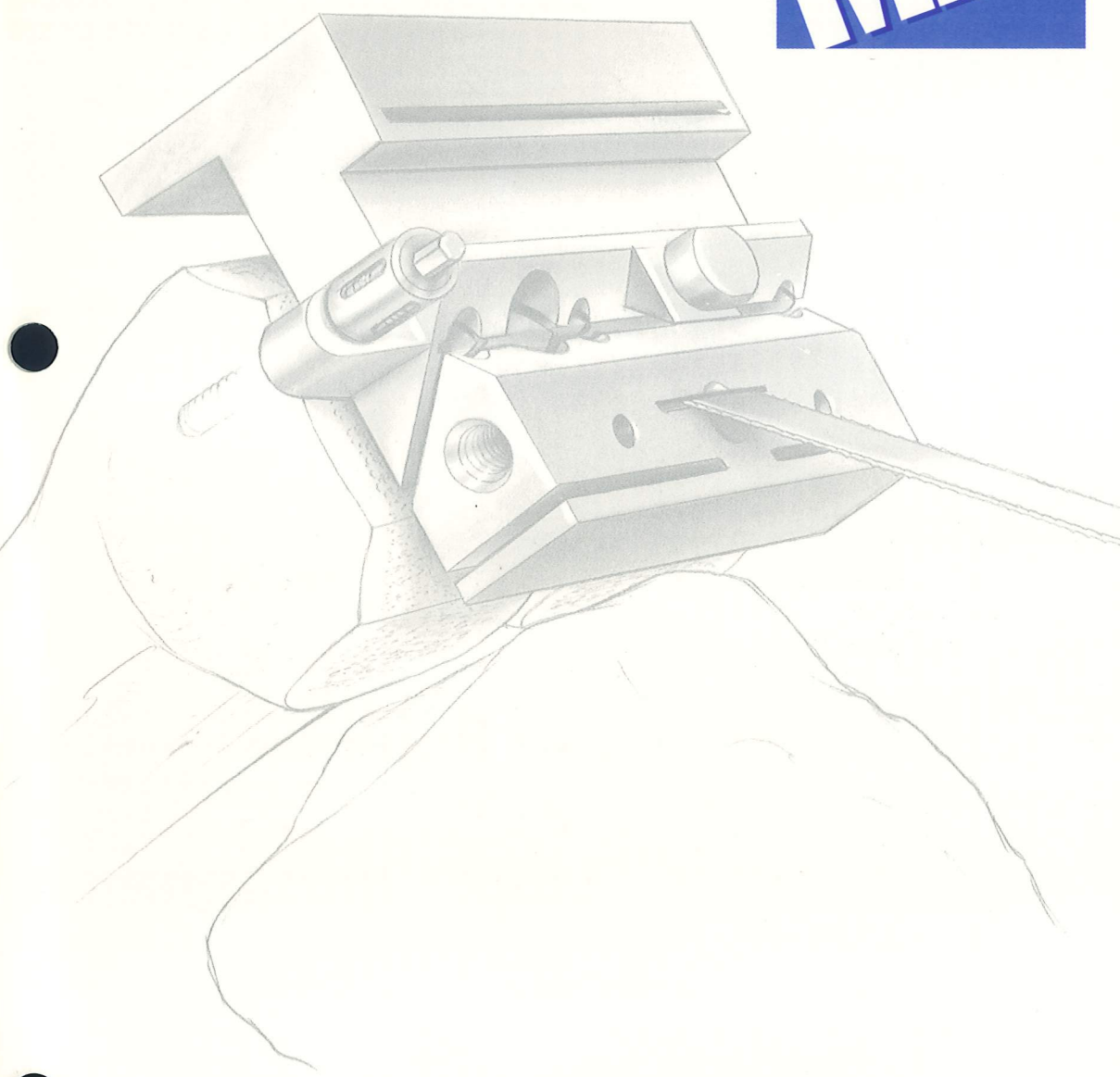




**INTRAMEDULLARY
INSTRUMENT
SURGICAL
TECHNIQUE**

For Mobile
Bearing
Knee



INTRODUCTION

Successful total knee arthroplasty is directly dependent on reestablishment of normal lower extremity alignment, proper component design and orientation, secure component fixation, and adequate soft tissue stability. The ZIMMER Intramedullary Knee Instrument System was designed to easily accomplish these goals, combining optimal alignment accuracy with a simple, straightforward technique.

The center of the hip, knee, and ankle are restored to lie on a straight line, establishing a neutral mechanical axis. The femoral and tibial components are oriented perpendicular to this axis. Well-designed instruments allow accurate cuts to help ensure secure component fixation. Ample component sizes allow soft tissue balancing with appropriate soft tissue release.

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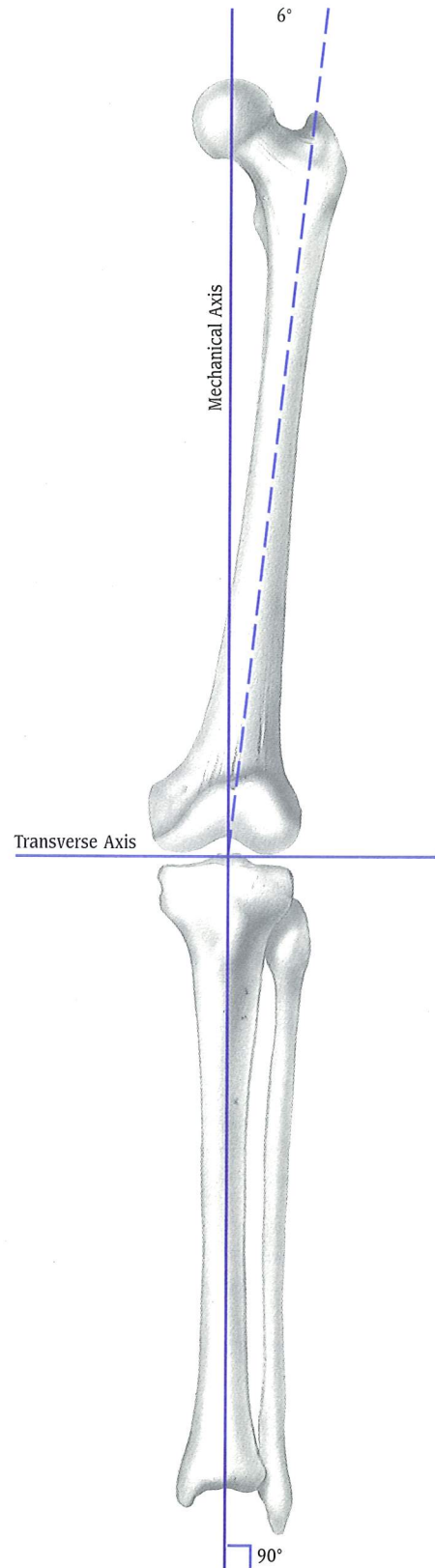
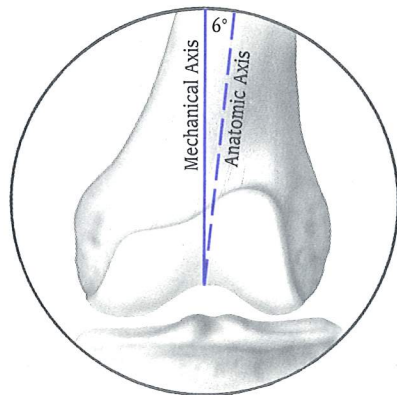
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PREOPERATIVE PLANNING

Use the template overlay (available through your Zimmer representative) to determine the angle between the anatomic axis and the mechanical axis. This angle will be reproduced intraoperatively. This surgical technique ensures that the distal femur will be cut perpendicular to the mechanical axis and, after soft tissue balancing, will be parallel to the resected surface of the proximal tibia.



STEP ONE

SIZE THE FEMUR/ESTABLISH EXTERNAL ROTATION

Drill a hole in the center of the patellar sulcus of the distal femur (Fig. 1), making sure that the hole is parallel to the shaft of the femur in both the anteroposterior and lateral projections. The hole should be approximately one centimeter anterior to the origin of the posterior cruciate ligament.

The step drill can be used to enlarge the entrance hole on the femur to 12mm in diameter. This will reduce IM pressure during placement of subsequent IM guides. Suction the canal to remove medullary contents.

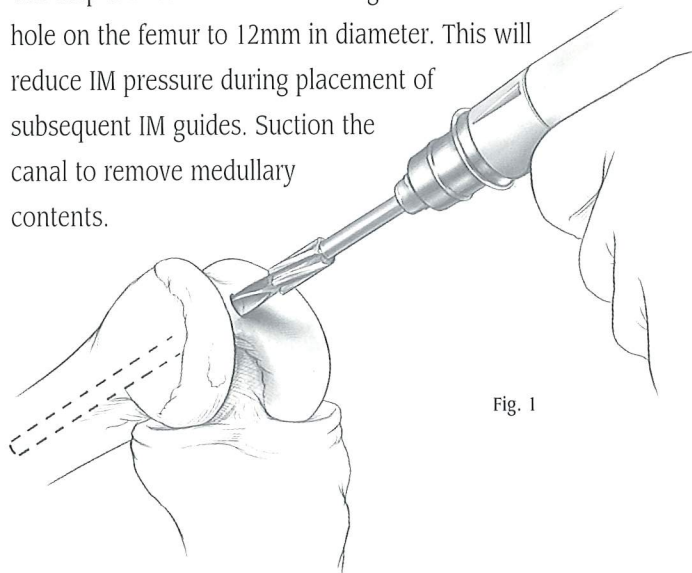


Fig. 1

The IM Femoral AP Sizing Guide can also be used to aid in setting 3° of external rotation of the femoral component in relation to the non-deformed posterior condyles. Select and drill through the appropriate holes in the guide being sure that the proper "Right" or "Left" indication is used. Drill one hole on each side, medial and lateral. This will place two reference holes on the femur at 3° of external rotation (Fig. 3). These holes will be used in conjunction with the IM Alignment Guide to set external rotation.

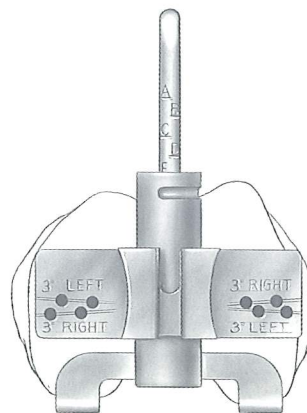


Fig. 2

Insert the IM Femoral AP Sizing Guide into the hole until it contacts the distal femur. Compress the guide until the anterior boom contacts the anterior cortex of the femur, and both feet rest on the cartilage of the posterior condyles. Flexion or extension of the guide can produce inaccurate readings. Check to ensure that the boom is not seated on a high spot, or an unusually low spot on the anterior cortex.

Read the femoral size directly from the guide (Fig. 2). If the indicator is between two sizes, choose the smaller size. The sizing can be confirmed in **STEP FIVE**, after the distal femoral cut has been made.

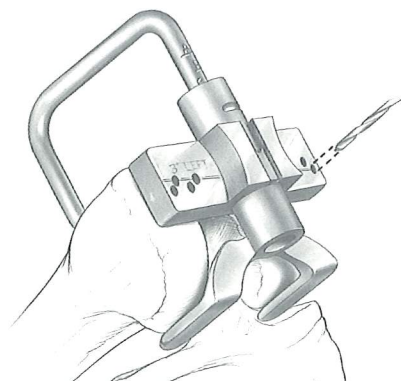
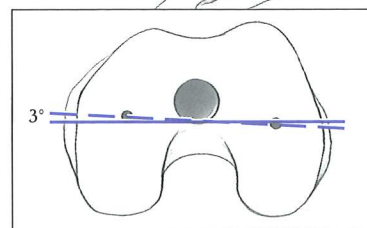


Fig. 3

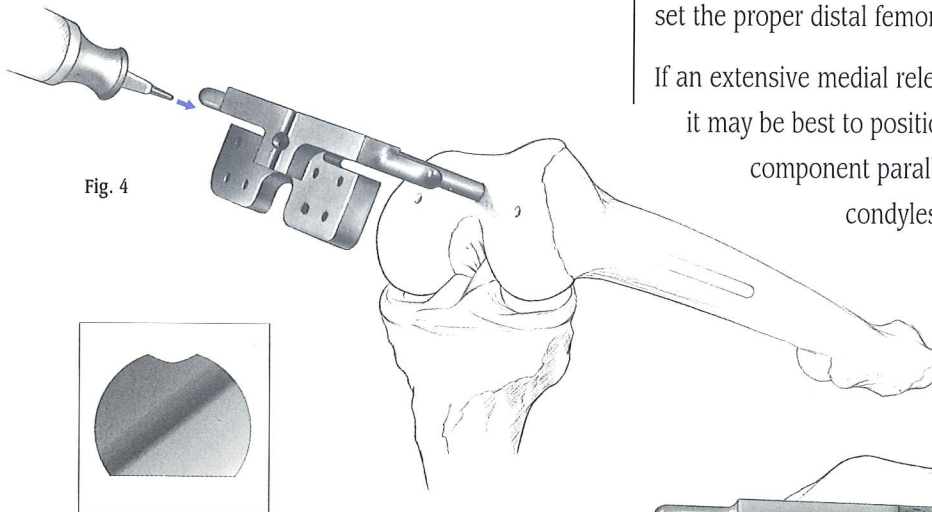




STEP TWO

ESTABLISH FEMORAL ALIGNMENT

The IM Alignment Guide has two intramedullary rod lengths which can be used. The standard instrument has a rod which is 9 inches long and provides the most accurate reproduction of the anatomic axis. If the femoral anatomy has been altered, as in a femur with a long-stem hip prosthesis or with a femoral fracture malunion, then the optional IM Alignment Guide with a 4-inch rod should be used. If the 4-inch rod is used, the extramedullary alignment technique **MUST** be used. It is preferable to use the longest intramedullary rod to guarantee the most accurate replication of the anatomic axis.



Using the Universal Handle, insert the IM Alignment Guide into the femur (Fig. 4). The rod is fluted and D-shaped to allow pressure to be released during the insertion. It is important to control rotation of the guide as it approaches the articular surface of the medial femoral condyle.

To achieve 3° of femoral component external rotation, use the alignment holes made in Step One. Line the holes up with the alignment slots

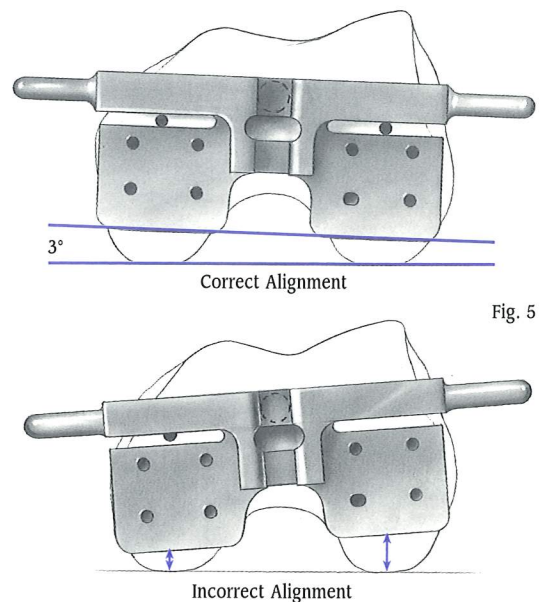
on the IM guide (Fig. 5). If needed to guide insertion, place 1/8-inch pins through the alignment slot on the IM guide and into the alignment holes.

Optional Technique:

The external rotation can also be set by referencing the epicondyles while positioning the handles of the guide, or by using the posterior condyles and referencing the posterior aspect of the IM guide. A Rotational Alignment Guide is available for easier referencing of the posterior condyles in large knees.

Once the proper external rotation is achieved, impact the IM guide until it seats on the most prominent condyle. Ensure that the guide is contacting at least one distal condyle. This will set the proper distal femoral resection.

If an extensive medial release is anticipated, it may be best to position the femoral component parallel to the posterior condyles with no external rotation.



STEP THREE

CUT THE ANTERIOR FEMORAL CONDYLES

Attach the Anterior Femoral Cutting Guide to the IM Alignment Guide. The boom of the guide should contact the anterior cortex of the distal femur just proximal to the anterior condyles. The boom should be placed in the same position as the AP Sizing Guide. With the boom touching this point, the cut will remove the anterior condyles flush with the anterior cortex of the femur. This should reduce the possibility of notching the anterior surface of the femoral cortex. Although this cut will be slightly modified with the Femoral Finishing Guide, it must be accurate for placement of subsequent cutting guides and for measurement.

Knees vary somewhat in size and configuration. If, on inspection of the instrument positioning, it is felt that excessive resection or notching might occur, the position of the Anterior Femoral Cutting Guide can be modified slightly. Loosen the knob and raise the guide so that the tip of the boom is clear of the femoral cortex by 1 or 2 mm. Then retighten and reset as described above.

Use an oscillating saw [1.27mm (.050") sawblade] to cut the anterior femoral cortex (Fig. 6), and remove the Anterior Femoral Cutting Guide when the cut is complete. Leave the Femoral IM Alignment Guide in the femur.

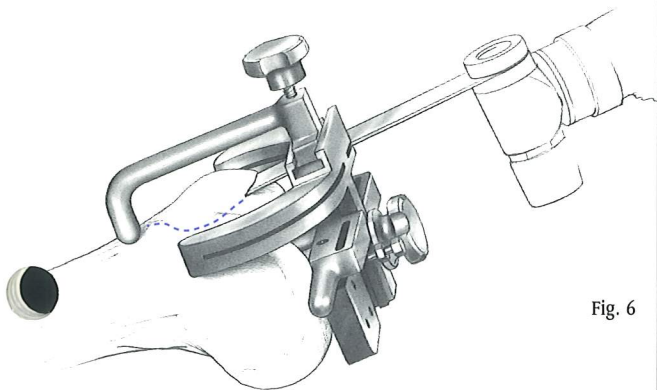


Fig. 6

STEP FOUR

CUT THE DISTAL FEMUR

Attach the MBK Distal Femoral Cutting Guide to the IM Alignment Guide. Place the RIGHT or LEFT label up, depending on which knee joint is being replaced. Drop the pivot pin into the pivot hole in the IM Alignment Guide. Observe the numbers on the anterior surface of the guide and select the appropriate angle as determined by pre-operative radiographs.

Insert a pin through the appropriate angle-setting hole in the cutting guide until it drops into the slot in the IM Alignment Guide (Fig. 7). This locks the angle and prevents movement of the guide.

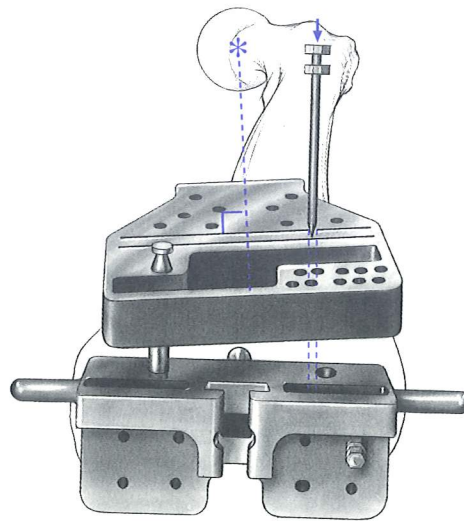


Fig. 7

Place holding pins through two or three of the pin holes in the anterior surface of the MBK Distal Femoral Cutting Guide to secure it further to the femur. Silver Spring Pins may also be used to secure the guide.

Note: If using spring pins, take care not to insert the pins in an area over the IM Rod in the medullary canal.

The IM Alignment Guide can either be removed or left in place. The advantage of removal is that one does not have to cut around the rod.





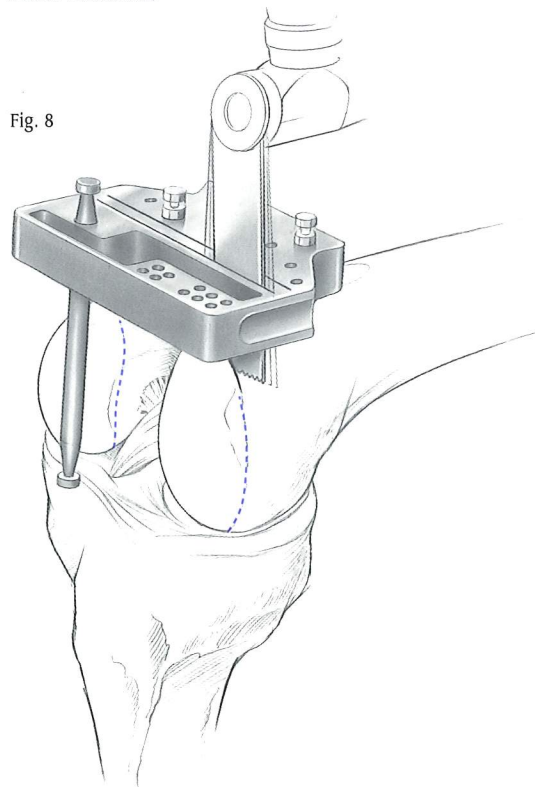
If fixation is tenuous, the advantage of leaving the device in place is that additional stability will be provided by the rod and distal pins.

Remove the IM Alignment Guide with the Slap-hammer Extractor.

(For an optional extramedullary alignment technique see page 7).

Cut the distal femur through the distal slot labeled "Standard Cutting Slot" in the cutting guide (Fig. 8). This slot removes the same amount of bone that will be replaced by the MBK femoral component. (The correct thickness of bone resection is determined in the previous step by having the IM Alignment Guide flush against the medial femoral condyle.) Cut both the medial and lateral condyles before removing the guide. A cut made through the "Optional" Cutting Slot will remove an additional 3.5mm of bone. This slot can be used if a flexion contracture exists or if the surgeon needs to resect additional bone for other reasons.

Fig. 8



Check the flatness of the distal femoral cut with a flat surface. One of the Femoral Finishing Guides or the Viewing Template is useful for this. If necessary, modify the distal femoral surface so that it is completely flat. This is extremely important for the placement of subsequent guides and for proper fit of the implant.

Removing Additional Bone

In some complex cases, such as a knee with a significant flexion contracture or a hypoplastic lateral femoral condyle associated with a valgus deformity, it may be necessary to cut additional bone from the distal femur. The proximal cutting slot labeled "Optional 3.5mm Cutting Slot" can be used to make this cut.

If there is any question as to how much bone to remove, the "Standard Cutting Slot" should be used initially and the cut repeated later if more bone removal is necessary. This situation might arise if, after provisional components have been inserted for trial reduction, it is found that the ligament tightness in extension is excessive after appropriate soft tissue release. This would be an indication for slightly more distal femoral resection (*See page 26 of the Appendix for distal femoral recutting techniques*).

Optional Technique:

To use an extramedullary alignment system to orient the distal femoral cut, insert the extramedullary Alignment Arch onto the MBK Distal Femoral Cutting guide after it has been secured to the IM Alignment Guide with the pivot pin. Insert a rod through the apex of the arch and pass it proximally toward the hip (Fig. 9). If the proximal tip of the rod points to the center of the femoral head, the MBK Distal Femoral Cutting Guide is properly positioned to cut the distal femur exactly perpendicular to the mechanical axis. Pin the cutting guide to the femur and cut the bone.

This technique can be used to double check the intramedullary method and **MUST** be used if the 4-inch IM Alignment Guide is used.

If the use of extramedullary alignment is anticipated, it is best to identify the center of the femoral head before draping. This can be done by placing a palpable radiopaque marker (e.g. an EKG electrode) over the area where the femoral head is thought to be and then taking an AP x-ray of the hip. The x-ray will show if the marker needs to be moved. This palpable appliance will then direct positioning of the rod during surgery.

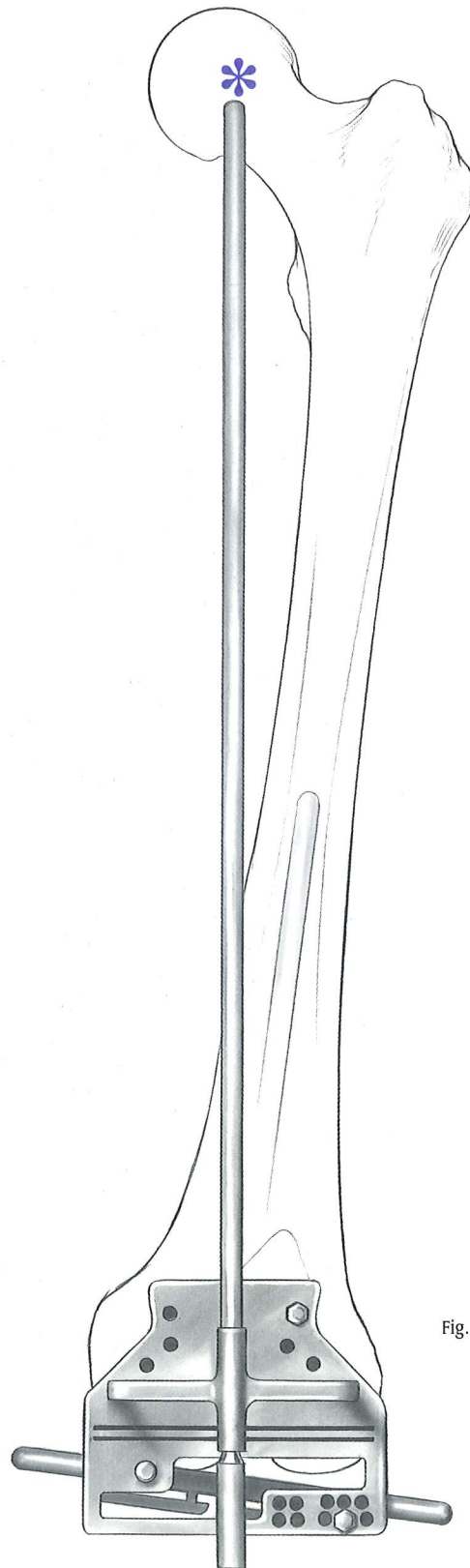


Fig. 9





SURGICAL OPTION

Determine the AP Dimension of the Distal Femur

To measure the AP dimension of the distal femur, or check the measurement made with the IM Femoral AP Sizing Guide in **STEP ONE**, place the Femoral AP Measuring Guide flat onto the smoothly cut distal femur (Fig. 10). The feet of the guide should rest on the cartilage of the posterior condyles. Hyperflexion of the knee assists in positioning the feet of the guide against the posterior condyles. In uncommon cases the proximal tibia may have to be resected first, before the guide can be properly positioned.

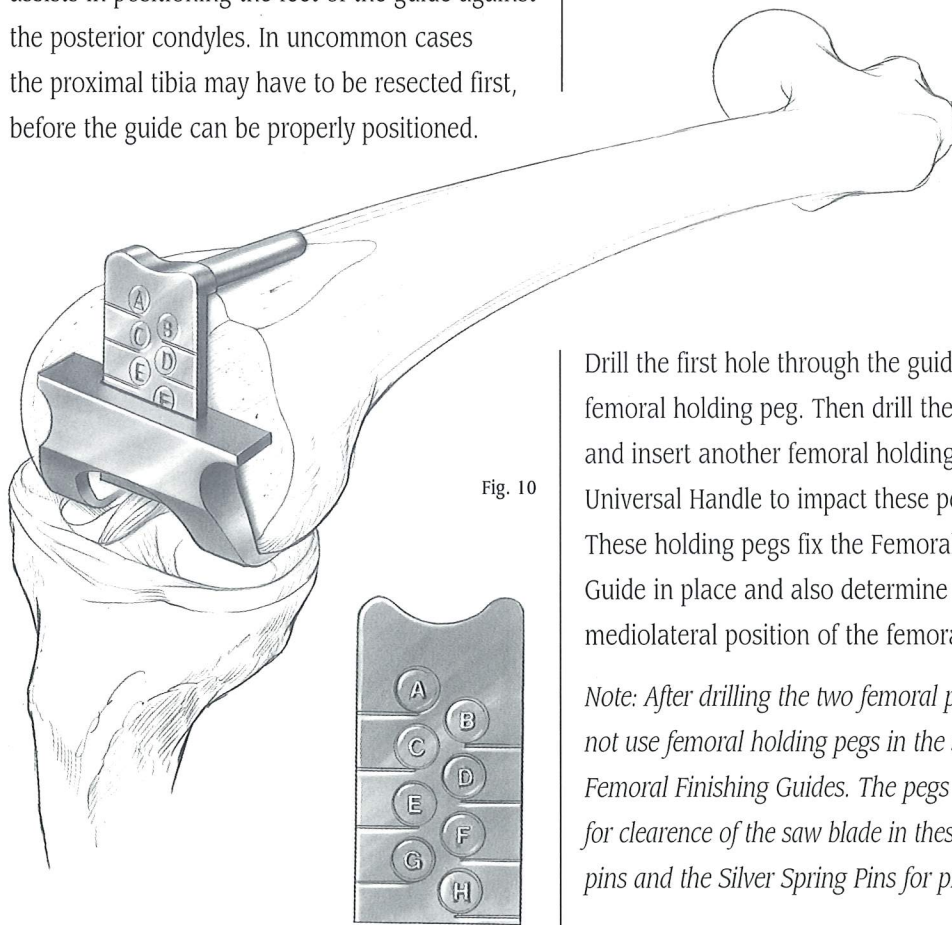


Fig. 10

Lower the gauge and read the proper size on the indicator of the gauge. The gauge should rest on the anterior femoral surface. There are eight sizes labeled "A" through "H". If the reading is between two sizes, choose the **SMALLER** size. This prevents excessive ligament tightness in flexion.

STEP FIVE

FINISH THE FEMUR

Select the correct size Femoral Finishing Guide as determined by the measurement from the AP Measuring Guide. Position the guide by setting the top ledge on the cut surface of the anterior femur. This determines the rotation of the instrument. It must be centered mediolaterally on the femur (Fig. 11).

Drill the first hole through the guide and insert a femoral holding peg. Then drill the second hole and insert another femoral holding peg. Use the Universal Handle to impact these pegs completely. These holding pegs fix the Femoral Finishing Guide in place and also determine the final mediolateral position of the femoral component.

Note: After drilling the two femoral post holes, do not use femoral holding pegs in the size A and B Femoral Finishing Guides. The pegs will not allow for clearance of the saw blade in these sizes. Use 1/8" pins and the Silver Spring Pins for proper stability.

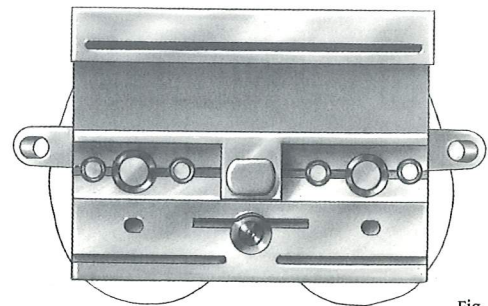


Fig. 11

To further stabilize the guide, insert a Silver Spring Pin through the tab on each side of the guide (Fig. 12) using the Female Hex Driver and Drill Reamer. The pins are designed to automatically disengage the pin driver when fully inserted on the guide.

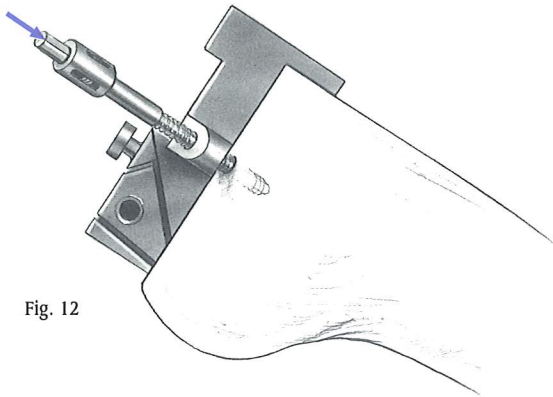


Fig. 12

Optional Technique:

If additional stability is desired or, if you do not want to commit to the location of the femoral peg holes at this point, the Femoral Finishing Guide can be secured with up to four short-head pins through the front. Use the Universal Handle to impact these pins.

Perform the final femoral cuts in the following sequence (Fig. 13) to allow the guide to maintain optimal stability during bone resection:

- 1) posterior condyles
- 2) posterior chamfers
- 3) anterior condyle
- 4) anterior chamfer
- 5) trochlear recess

Use the center slot on the distal face of the guide to cut the base of the trochlear recess with a reciprocating saw (Fig. 14). Ensure that the saw blade is in line with the femur throughout the cut, and do not angle or fan the blade medially or laterally.

Use the two slots on the anterior face of the guide to make reference marks by scoring the femur with a reciprocating sawblade to determine the sides of the trochlear recess (Fig. 15).

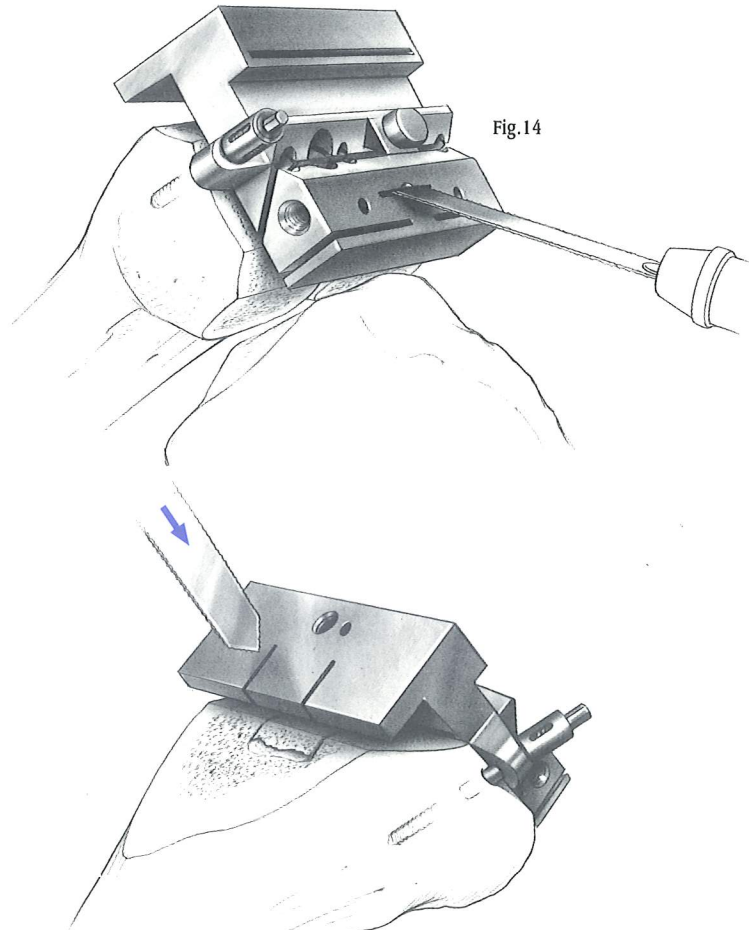


Fig. 14

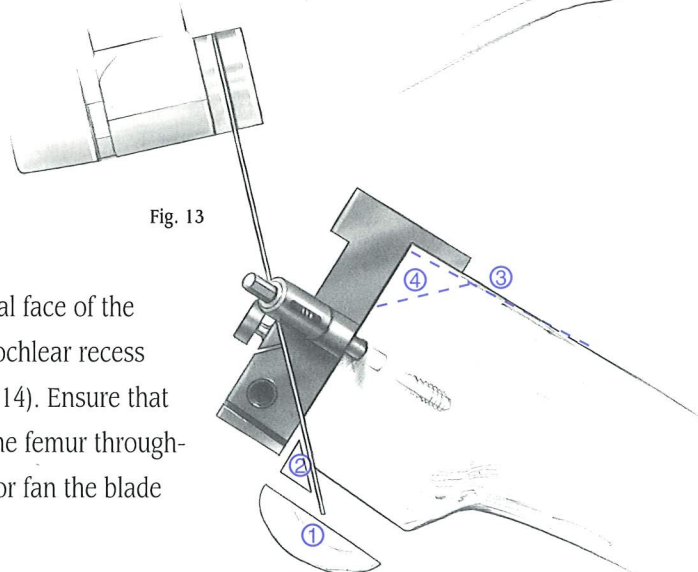


Fig. 13

Fig. 15





When complete, use the Female Hex Driver to remove the two Silver Spring Pins.

Place the Female Hex Driver over the spring pin and apply a downward force on the driver sleeve (Fig. 16). Start the drill/reamer slowly until the driver hex engages the hex head of the pin. Continue until the spring pin disengages bone.

Use the Slaphammer Extractor to remove the femoral finishing guide, and use a reciprocating saw to complete the sides of the trochlear recess at the two reference marks. (See pages 28-29 in the Appendix for optional methods of cutting the trochlear recess.)

Check the cut surfaces for flatness.

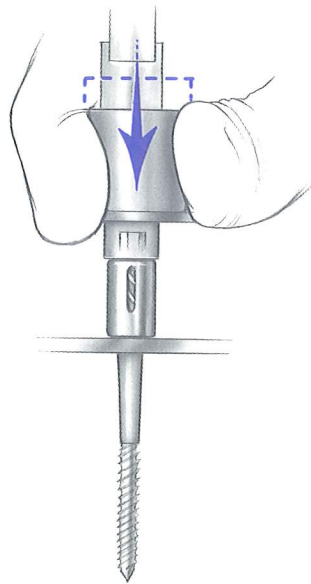


Fig. 16



STEP SIX

CUT THE PROXIMAL TIBIA

To improve the exposure of the tibial surface, lever the tibia anteriorly using the Tibial Retractor. This instrument should be carefully positioned hugging the posterior cortex of the tibia subperiosteally to prevent neurovascular injury. Another tibial retractor can be used to retract the patella laterally.

Using the IM Tibial Resector

A preoperative radiograph of the tibia is necessary to make sure that the tibial shaft is straight and will accept the 8mm intramedullary rod. Some tibias are crooked or have too small a canal and will not accept the rod. The acetate template used for femoral planning can be inverted and used on the tibia.

Use the Universal Handle to start a hole in the proximal tibia just anterior to the anterior cruciate ligament insertion and centered mediolaterally (Fig. 17). This may seem too far anterior; however, it is the straight proximal extension of the tibial medullary canal. If a hole is started further posteriorly, excessive posterior slope may be cut into the proximal tibia.

Drill a hole using the 8mm IM Drill. Suction the canal to remove medullary contents.

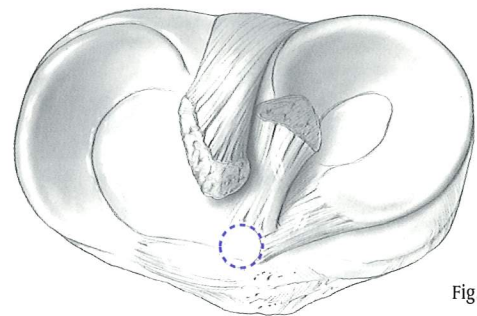


Fig. 17

Slowly insert the rod of the IM Tibial Resector up to the shoulder of the larger portion of the rod. The flutes on the rod will allow decompression of the canal during insertion. Attach the cutting platform to the rod and adjust the platform so that it contacts the anterior tibia (Fig. 18). Rotate the platform so that it is on the front of the tibia.

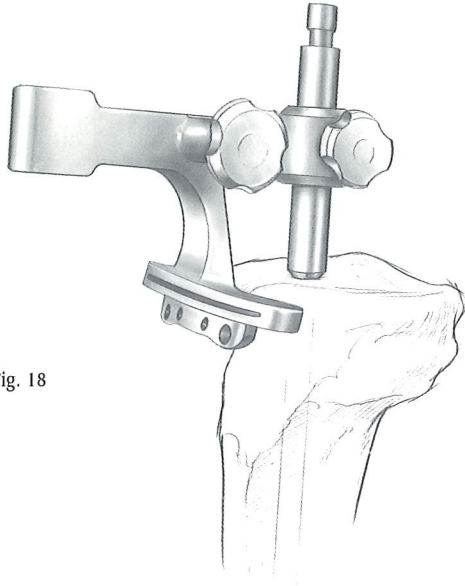


Fig. 18

Use the Extramedullary Alignment Rod to make sure the cutting platform is perpendicular to the mechanical axis of the tibia. Place the rod through the anterior slotted extension of the guide and extend it to the center of the ankle. The center of the talus (the true center of the ankle) is, surprisingly, about 5-10mm medial to the midpoint between the subcutaneous palpable medial and lateral malleoli. Another accurate landmark is the subcutaneous tibial crest about 3 inches above the ankle joint. This usually corresponds with the true center of the ankle. This step is important because some tibias have a curve in the shaft. If necessary, adjust the angle of the cutting platform to position it perpendicular to the mechanical tibial axis (Fig. 19).

Slide the cutting platform posteriorly until it contacts the anterior tibia. Tighten the thumb screw to lock it into position.

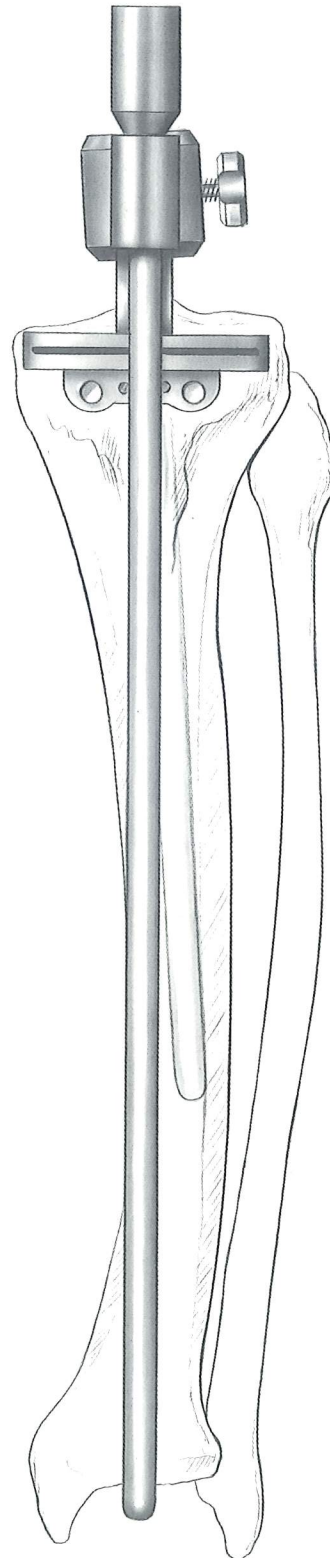


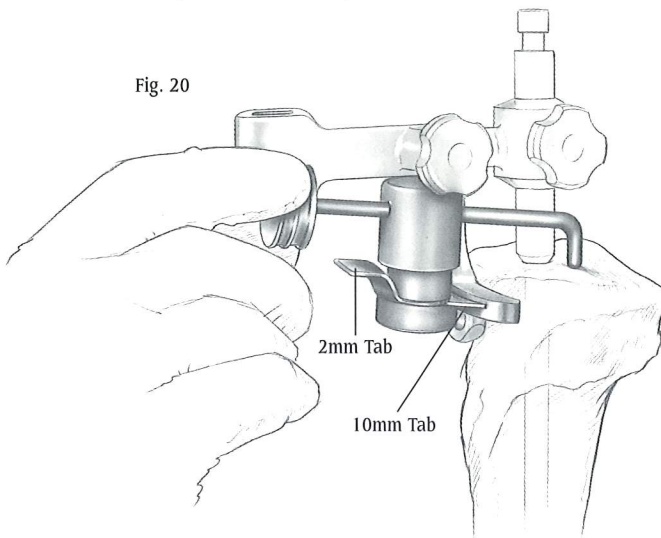
Fig. 19





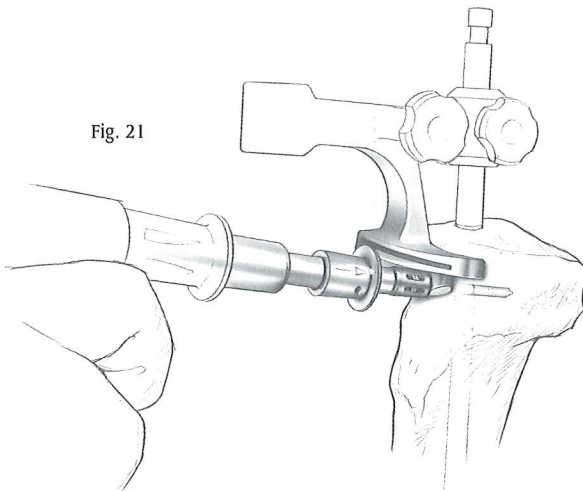
Adjust the height of the cutting platform for the desired depth of cut. A Tibial Depth Resection Gauge is available to help determine the position of the cutting platform (Fig. 20). This gauge has two tabs. One tab is located at 2mm and is used to check the depth from the defective tibial condyle for a minimal cut. The other tab is located at 10mm and can be used to check the depth from the good tibial condyle for an anatomic cut.

Fig. 20



Place the 2mm tab into the cutting slot. The arm of the gauge should rest in the deepest part of the defective condyle. Be sure the mark on the arm of the gauge is lined up with the mark on the base of the gauge. This ensures that the arm is properly rotated within the base. This positions

Fig. 21



the cutting slot to remove 2mm of bone below the tip of the gauge.

Place the 10mm tab into the cutting slot, and adjust the platform until the arm of the gauge rests on the cartilage of the good condyle. This will allow the removal of the same amount of bone that the thinnest tibial component would replace.

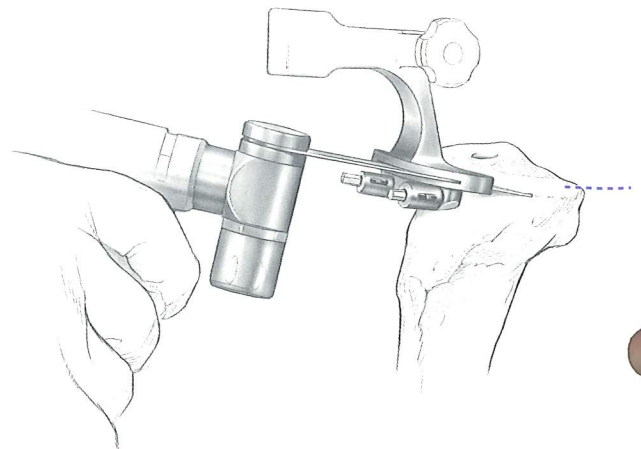
These two points of resection will not frequently coincide. The surgeon must decide between an anatomic and a minimal resection based on patient age, bone quality, and the type of prosthetic fixation planned.

Before pinning the cutting platform to the bone, check the location of the cut on the posterior tibia by placing the Tibial Resection Guide through the cutting slot.

Then secure the cutting platform to the tibia with two Silver Spring Pins (Fig. 21). With the platform properly positioned and pinned to the tibia, loosen the knobs fixing the guide to the IM rod and remove the IM rod with the Slaphammer Extractor. Make the proximal tibia cut using the slot in the guide (Fig. 22). A bone island at the PCL attachment cannot be left. It will restrict the rotation of the articular surface.

Remove the spring pins and guide.

Fig. 22



Using the Extramedullary Tibial Cutting Guide

The Extramedullary Tibial Cutting Guide allows for variability in the thickness of tibial resection after the alignment of the guide has been secured. This facilitates the handling of bone defects in the proximal tibia. Initially set the cutting platform in the middle of its range of travel so it can be adjusted up or down.

Determine the center of the ankle and place the foot of the Extramedullary Tibial Cutting Guide over the distal tibia pointing to the center of the ankle (Fig. 23). The center of the talus (the true

center of the ankle) is, about 5-10mm medial to the midpoint between the subcutaneous palpable medial and lateral malleoli. Another accurate landmark is the subcutaneous tibial crest about 3 inches above the ankle joint. This usually corresponds with the true center of the ankle.

Adjust the slide at the foot of the guide so that the body of the guide is parallel with the anterior tibial shaft (Fig. 24). If there is a bulky bandage around the ankle, adjust the slide to accommodate the bandage. This will ensure that the tibia will be cut at a 7-degree posterior slope.

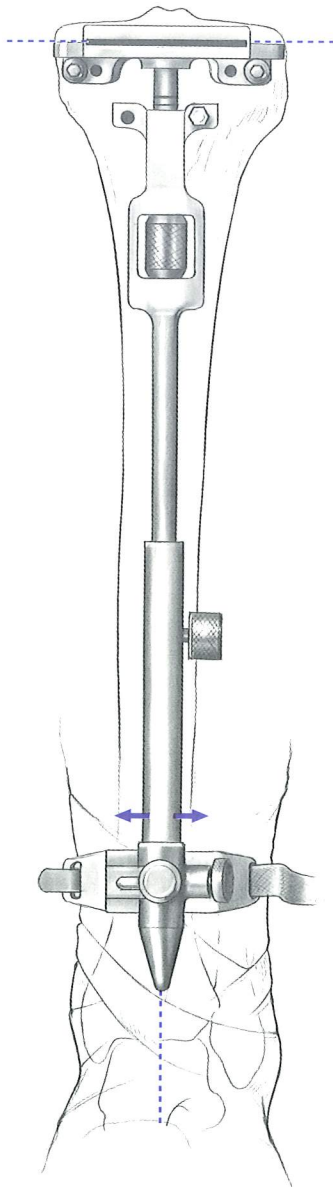


Fig. 23

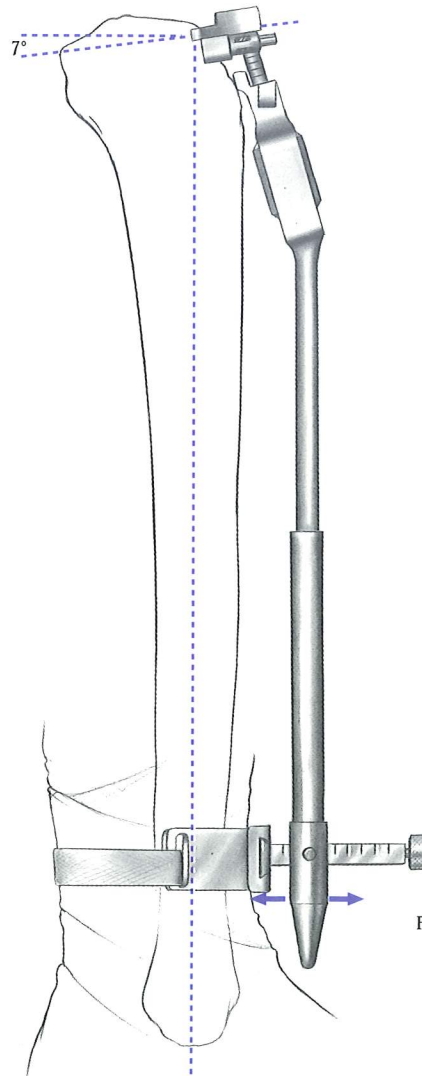


Fig. 24



Position the guide at the proximal tibia so it is proximal to the tibial tubercle beneath the infrapatellar ligament. Center the guide over the proximal tibia in the mediolateral direction so it parallels the mechanical axis of the tibia. The longitudinal axis of the guide will usually lie just medial to the mid-point of the tibial tubercle and be centered over the inter-condylar eminence.

Hold the guide in position and pin it to the proximal tibia with one pin on the lateral side. Fine tune all the distal guide positions. Then, insert a second pin in the proximal portion to secure the guide.

Adjust the cutting platform proximal or distal to the desired level of tibial resection (Fig. 25). It is helpful to position the cutting platform in the mid-position prior to using the guide so that, after the guide is fixed to the tibia, the cutting platform can move proximally or distally.

A Tibial Depth Resection Gauge is available to help determine the position of the cutting platform (Fig. 26). This gauge has two tabs. One tab is located at 2mm and is used to check the depth from the defective tibial condyle for a minimal cut. The other tab is located at 10mm

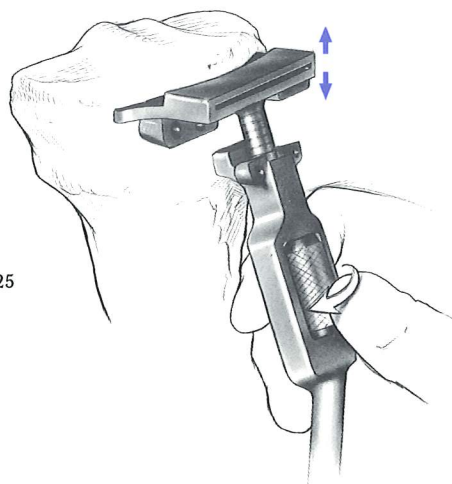


Fig. 25

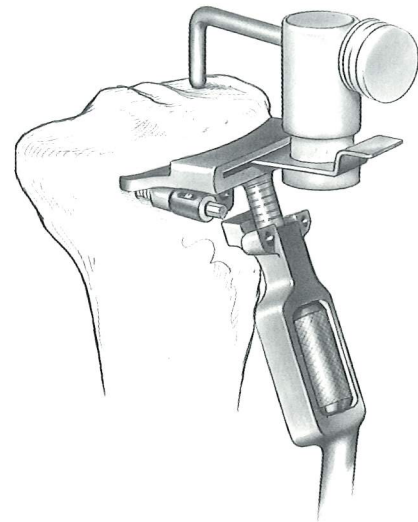


Fig. 26

and can be used to check the depth from the good tibial condyle for an anatomic cut.

Place the 2mm tab into the cutting slot. The arm of the gauge should rest in the deepest part of the defective condyle. Be sure the mark on the arm of the gauge is lined up with the mark on the base of the gauge. This ensures that the arm is properly rotated within the base. This positions the cutting slot to remove 2mm of bone below the tip of the gauge.

Place the 10mm tab into the cutting slot, and adjust the platform until the arm of the gauge rests on the cartilage of the good condyle. This will allow the removal of the same amount of bone that the thinnest tibial component would replace.

These two points of resection will not frequently coincide. The surgeon must decide between an anatomic and a minimal resection based on patient age, bone quality, and the type of prosthetic fixation planned.

Before pinning the cutting platform to the bone, check the location of the cut on the posterior tibia by placing the Tibial Resection Guide through the cutting slot (Fig. 27).

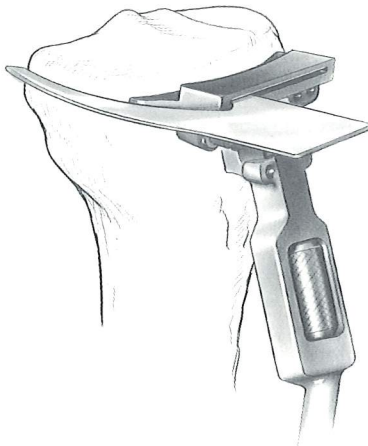


Fig. 27

Secure the cutting platform by inserting two 1/8" fixation pins or two Silver Spring Pins. The posterior surface of the guide should parallel the anterior surface of the tibia. The cutting platform is designed so the tibial cut can be made either on top of the guide or through the slot in the guide. Both of these cutting surfaces are sloped posteriorly 7 degrees to the mechanical axis and only the height of resection varies. If the Tibial Depth Resection Gauge was used to determine the amount of resection, the slot should be used

to make the cut. Use an 1.27mm (.050") oscillating sawblade to cut the upper surface of the tibia flat (Fig 28). A bone island at the PCL attachment cannot be left. It will restrict the rotation of the articular surface. Remove the Extramedullary Tibial Cutting Guide when the tibial preparation is complete.

If the first cut of the proximal tibia is not deep enough, lower the cutting platform to the desired level. Secure the telescoping portion of the guide using different pin holes on the cutting platform and recut the tibia. Calibrations on the telescoping portion of the guide are 2mm apart.

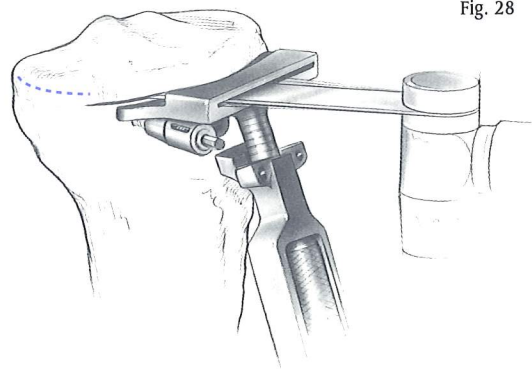


Fig. 28

Optional Techniques:

The 2mm Recutter can be used or if varus/valgus correction is required, the 2° Varus/Valgus Recutter is available. Both recutters reference the existing cut and are secured to the bone with 1/8" pins.





STEP SEVEN

PREPARE THE PATELLA

Sharply dissect through the pre-patellar bursa to expose the anterior surface of the patella. This will provide exposure for affixing the anterior surface into the patella clamp and assures accurate bone resection.

Remove all osteophytes and synovial insertions from around the patella. Be careful not to damage tendon insertions onto the bone. Use the caliper to measure the thickness of the patella (Fig. 29). Subtract the implant thickness from the patella thickness to determine the amount of bone that should remain after resection.

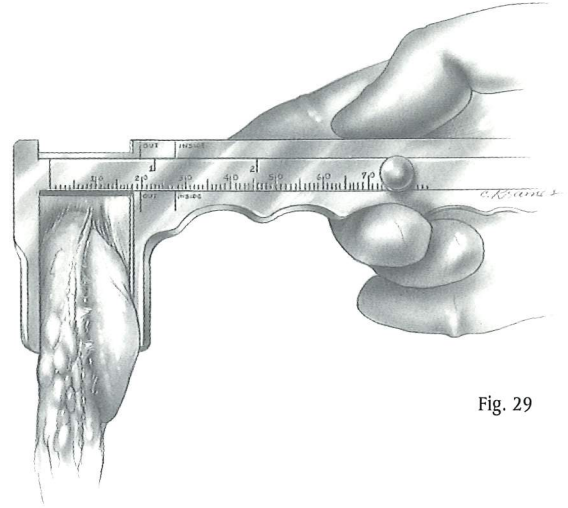


Fig. 29

PATELLA THICKNESS - IMPLANT THICKNESS = BONE REMAINING

NexGen ALL-POLY IMPLANT THICKNESSES

	<u>Standard</u>
26mm*†	7.5mm
29mm*	8.0mm
32mm*	8.5mm
35mm	9.0mm
38mm	9.5mm
41mm	10.0mm

* Do not use 26mm, 29mm and 32mm patellas with MBK size G and H Femoral Components.

† 26mm patella for inset only.

Note: At least 11mm of total bone will remain to allow for implant pegs if the Patella Reamer is used.

RESECT THE PATELLA

Patella Reamer Technique

TOTAL SURFACING PROCEDURE

Use the Patella Reamer Surfacing Guides as templates to determine the appropriate size guide and reamer. Choose the guide which fits snugly around the patella, using the smallest guide possible (Fig 30). If the patella is only slightly larger than the Total Surfacing Guide in the mediolateral dimension, use a rongeur to remove the medial or lateral edge until the bone fits the guide.

Insert the appropriate size Patella Reamer Surfacing Guide into the Patella Reamer Clamp (Fig 31). Turn the locking screw until tight.



Fig. 30

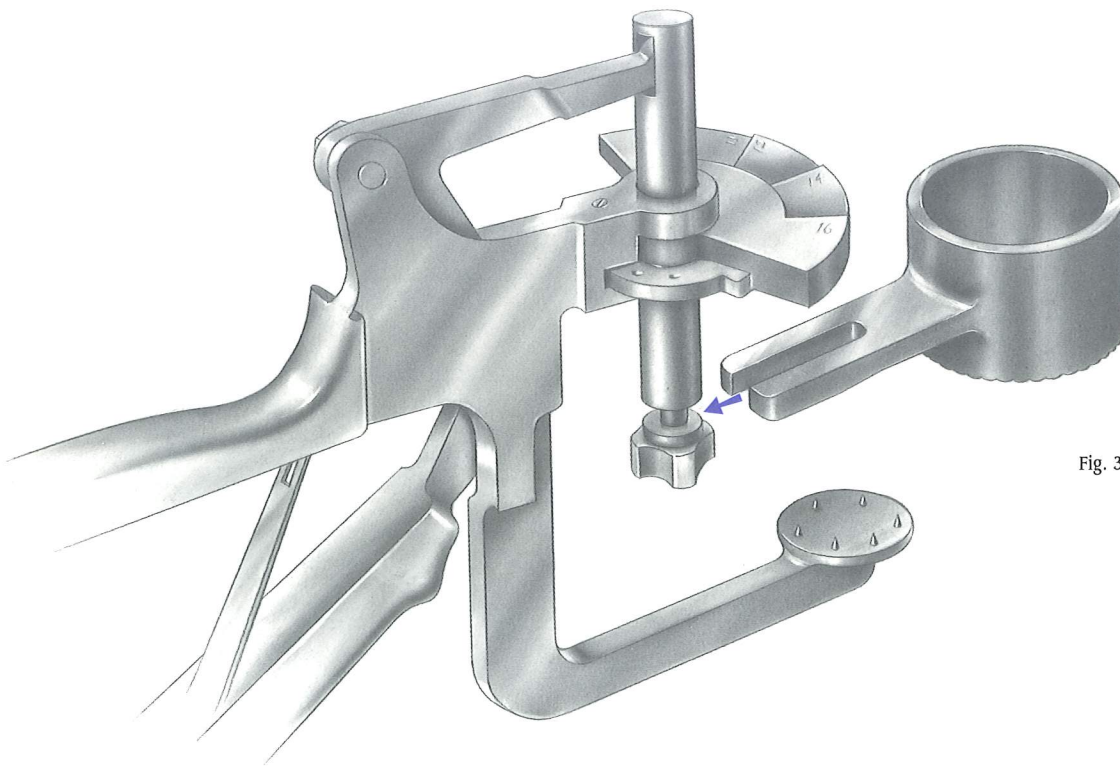


Fig. 31



Apply the Patella Reamer Clamp at a 90° angle to the longitudinal axis with the Patella Reamer Surfacing Guide encompassing the articulating surface of the patella. Squeeze the clamp until the anterior surface of the patella is fully seated against the fixation plate (Fig. 32). Turn the clamp screw to hold the instrument in place. The anterior surface must fully seat upon the pins and achieve parallel contact with the fixation plate.

Turn the clamp wing to the proper indication for the correct amount of bone that is to remain after reaming (Fig. 33).

Attach the appropriate size Patella Reamer Blade to the appropriate size Patella Reamer Shaft (Fig. 34). Use only moderate hand pressure to tighten the blade. Do not overtighten the blade. Insert the Patella Reamer Shaft into a Drill/Reamer. Insert the reamer assembly into the Patella Reamer Surfacing Guide. Raise the reamer slightly off the bone and bring it up to full speed. Advance it slowly until the prominent high points are reamed off. Continue reaming with moderate pressure until the step on the reamer shaft bottoms out on the clamp wing. Remove the reamer clamp assembly.

Fig. 32

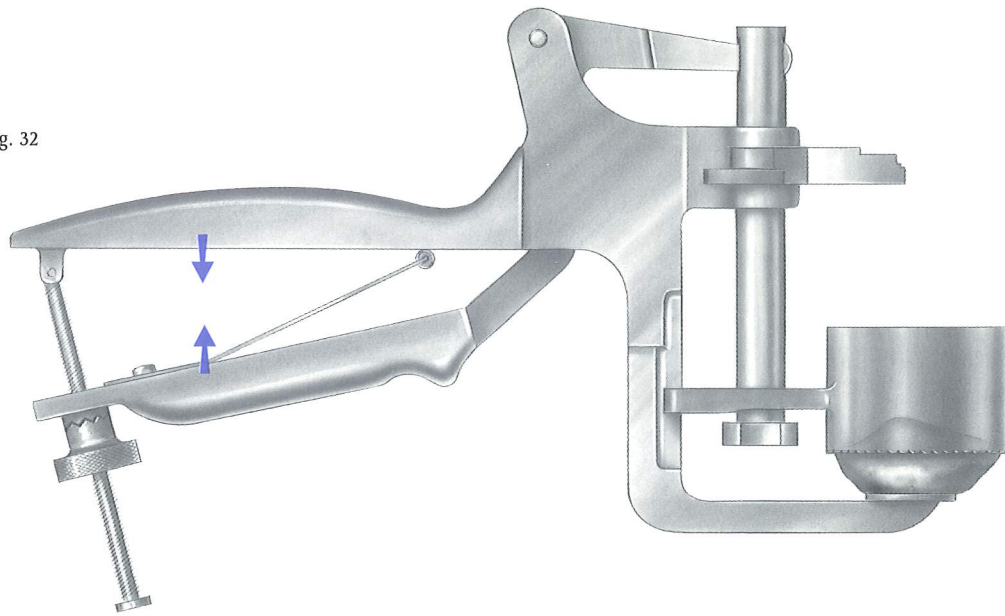


Fig. 34

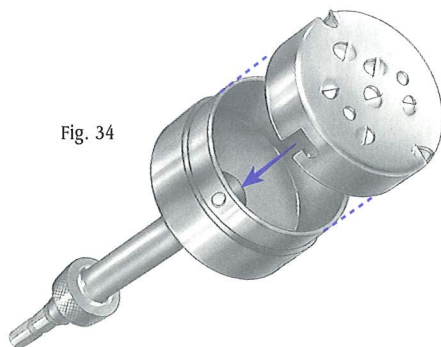
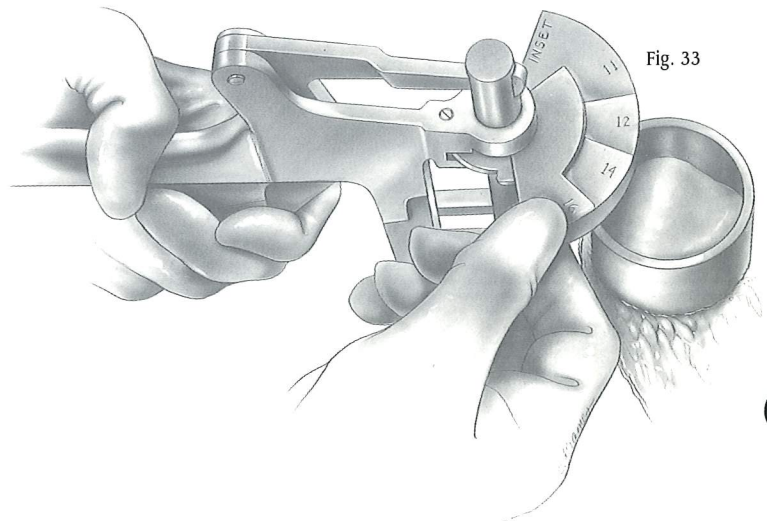
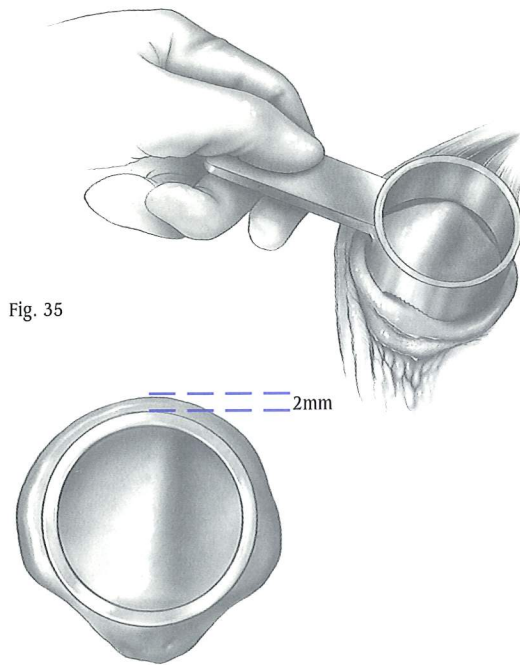


Fig. 33



INSETTING PROCEDURE

Use the Patella Reamer Insetting Guides as templates to determine the appropriate size guide and reamer. Choose the guide which will allow approximately 2mm between the superior edge of the patella and the outer diameter of the guide (Fig. 35).

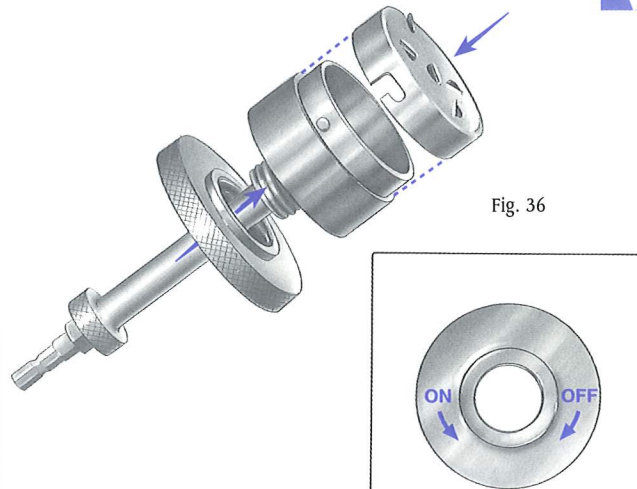


Insert the appropriate size Patella Reamer Insetting Guide into the Patella Reamer Clamp. Turn the locking screw until tight.

Apply the Patella Reamer Clamp at a 90° angle to the longitudinal axis with the Patella Reamer Insetting Guide on the articulating surface. Squeeze the clamp until the anterior surface of the patella is fully seated against the fixation plate. Turn the clamp screw to hold the instrument in place. The anterior surface must fully seat upon the pins and achieve parallel contact with the fixation plate.

Turn the clamp wing to the "inset" position.

Attach the appropriate size Patella Reamer Blade to the appropriate size Patella Reamer Shaft. Use only moderate hand pressure to tighten the blade. Do not overtighten the blade (Fig. 36).



Use the Patella Reamer Depth Stops to control the amount of bone to be removed based on the thickness of the implant chosen. The Depth Gauge Wing can be used instead of the stops to control the amount of bone remaining, rather than the amount of bone removed. The procedure is then the same as that described under total surfacing.

Insert the reamer assembly into the Patella Reamer Insetting Guide. Raise the reamer slightly off the bone and bring it up to full speed. Advance it slowly until the prominent high points are reamed off. Continue reaming with moderate pressure. Remove the Reamer Clamp assembly.



Universal Saw Guide Technique

Apply the Universal Patellar Saw Guide in line with the patellar tendon. Push the patella up between the jaws of the saw guide. Level the patella within the saw guide jaws and use the thumbscrew to tighten the guide.

The amount to be resected across the top of the saw guide jaws should be approximately the same on all sides. Check to be sure that the ten millimeter gauge does not rotate beneath the anterior surface of the patella. If the gauge hits the anterior surface of the patella as it is rotated, this indicates that at least ten millimeters of bone stock will remain after the cut (Fig. 37).

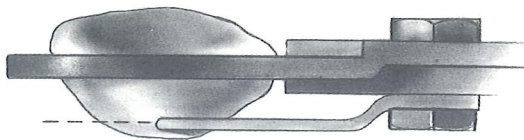
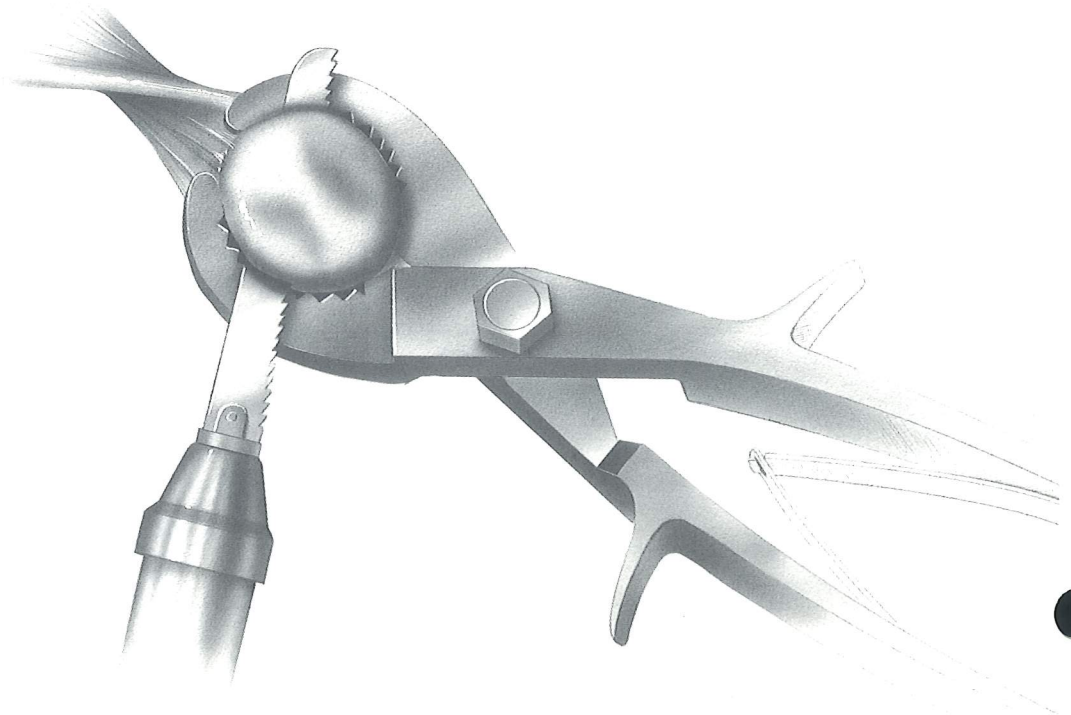


Fig. 37

Cut the patella flat so that a smooth surface remains (Fig. 38).

Fig. 38



FINISH THE PATELLA

Center the appropriate Patellar Drill Guide over the patella with the handle on the medial side of the patella and perpendicular to the tendon. Holding the drill guide firmly in place, drill the three peg holes using the Patellar/Femoral Drill Bit (Fig. 39).

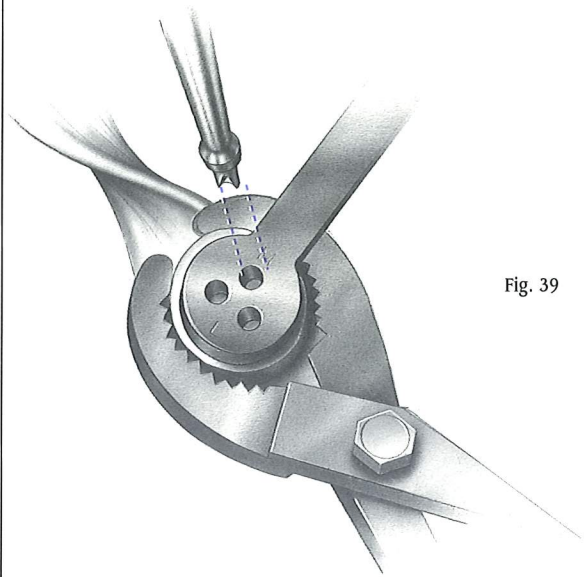


Fig. 39

STEP EIGHT

FINISH THE TIBIA

Select the proper size of Tibial Sizing/Positioning Plate. Ensure that the plate chosen provides the desired tibial coverage and is one of the three tibial plate sizes designated on the anterior flange of the femoral provisional. Attach the MBK Tibial Holding Clamp to the selected sizing plate by placing the cut-out of the clamp over the anterior rail of the plate. Secure it by tightening the thumb screw (Fig. 40).

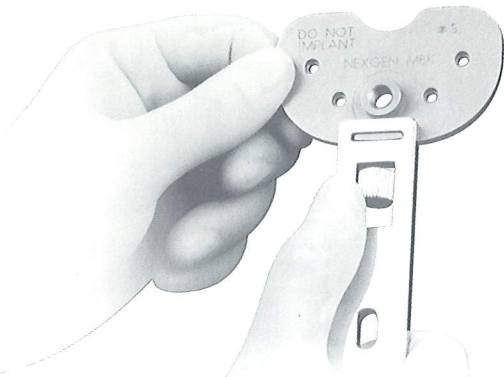
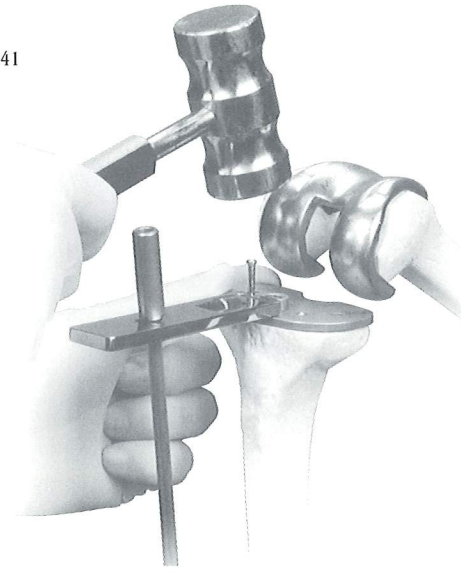


Fig. 40

Then use the Alignment Rod to aid in confirming varus valgus alignment and posterior slope. Rotate the plate so the handle of the holding clamp points at, or slightly medial to, the midpoint of the tibial tubercle. Pin the plate in place with two small head holding pins and impact so the head of the pin is recessed below the surface of the plate (Fig. 41).

Insert the proper provisional femur. Select the letter of the articular surface that is the same as the letter of the femoral provisional and position it on the tibial plate. Flex and extend the knee with the provisionals in place (Fig. 42). The tibial component should be positioned such that the anterior rail does not impede the rotation of the articular surface provisional. Ensure that soft tissue balance

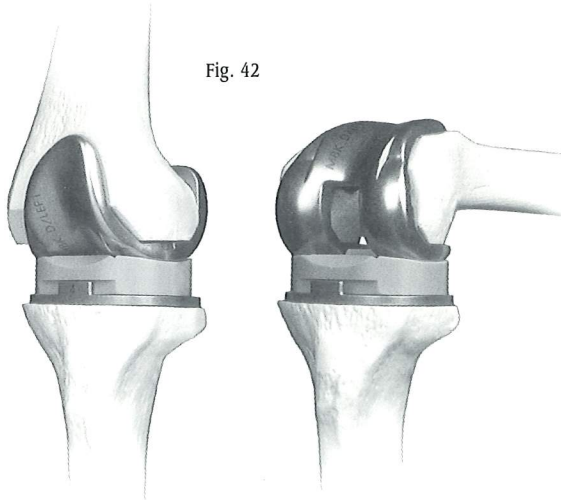
Fig. 41



is appropriate. If the articular surface provisional lifts off anteriorly during flexion the PCL should be recessed, or can be sacrificed, as necessary. In deep flexion the articular surface provisional should exhibit approximately 5 to 7mm of rollback on the lateral side and slightly less on the medial side. If stability is not achieved, conversion to the *NexGen® Legacy®* LPS should be considered.

With the plate position appropriately selected, the articular surface provisional and sizing/positioning plate can be removed from the tibial surface. The same size Fluted Stem Sizing Plate can then be placed onto the proximal tibial surface.

Fig. 42



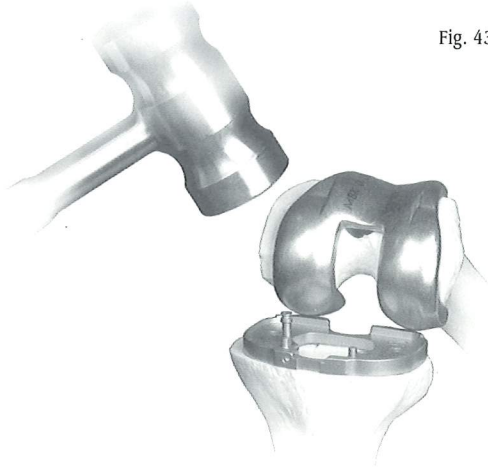


Fig. 43

Pin the plate with short head holding pins (Fig. 43). Use the pin holes created by the small head pins used to secure the tibial sizing/positioning tray. This will ensure that the position of the plate does not change.

Place the Tibial Drill Guide on sizing the plate and drill for the stem with the 15mm Drill (Fig. 44). Drill until the first engraved line on the drill is in line with the top of the drill sleeve.

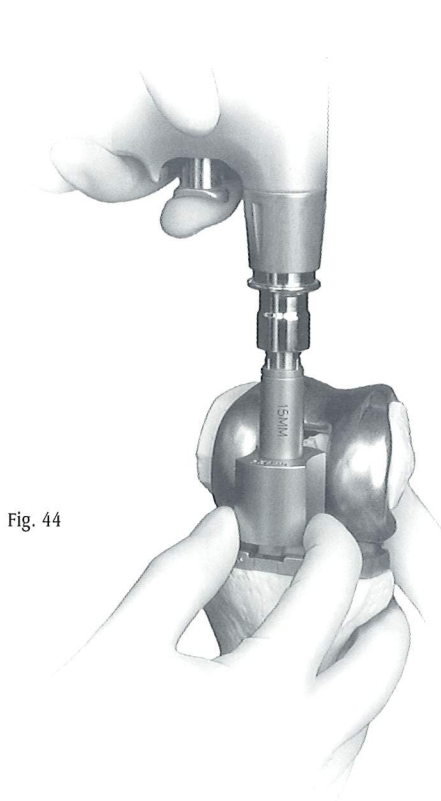


Fig. 44

Assemble the proper size Fluted Stem Tibial Broach to the Broach Impactor. The broach can only be assembled from the front. Seat the impactor on the sizing plate and impact the broach to the proper depth indicated by the etched groove on the shaft aligning with the impactor handle. The broach has a built-in stop so it cannot be over-impacted (Fig. 45).

Remove the impactor assembly using the built-in slaphammer, then remove the sizing plate.

Use the correct size trial tibia to ensure proper fit before implanting the final components.



Fig. 45

TRIAL REDUCTION

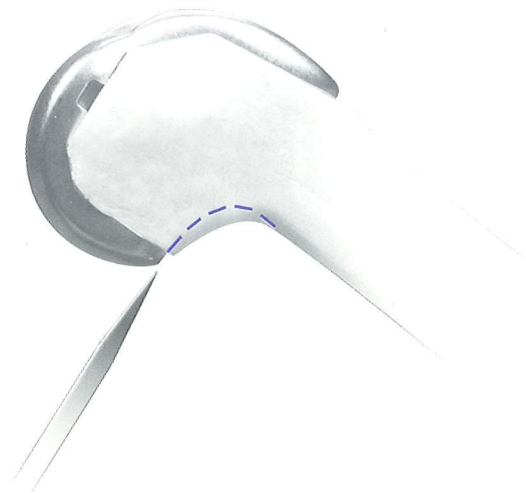
Insert the femoral and patellar provisional components and the correct size tibial provisional. Remember that the tibial component selected should match one of the three tibial sizes designated on the anterior flange of the femoral provisional. Similarly, the femoral component selected should match one of the three femoral sizes designated on the proximal surface of the tibial provisional. Insert the proper height and size articular surface provisional and check the range of motion and ligament stability. The articular surface provisional size must match the femoral provisional size exactly. If the articular surface provisional lifts off anteriorly during flexion the PCL should be recessed, or can be sacrificed, as necessary. Perform any necessary soft tissue releases. If stability is not achieved, conversion to the *NexGen Legacy* LPS should be considered. The Femoral Extractor can be used to remove the femoral provisional.

COMPONENT IMPLANTATION

After the implants have been chosen, make one last check to ensure that the femoral, tibial and articular surface components match. The femoral letter must match the articular surface letter and must be one of the three letters indicated on the tibial carton. The tibial number must match one of the three numbers indicated on the articular surface carton.

It may be necessary to remove femoral bone or osteophytes proximal to the posterior condyles. The bone must be removed to avoid impingement with the articular surface in deep flexion. Remove bone, as necessary, with an osteotome (Fig. 46).

Fig. 46





ARTICULAR SURFACE INSERTION

The articular surface implant is assembled by hand onto the D-shaped mushroom on the tibial plate proximal surface. Slide the articular surface between the femoral and tibial components and rotate it internally approximately 15 degrees (Fig. 47). The indent along the anterior flat of the articular surface can be used to orient the articular surface in relation to the anterior rail of the tibial plate. Once properly aligned, the articular surface will snap onto the plate.

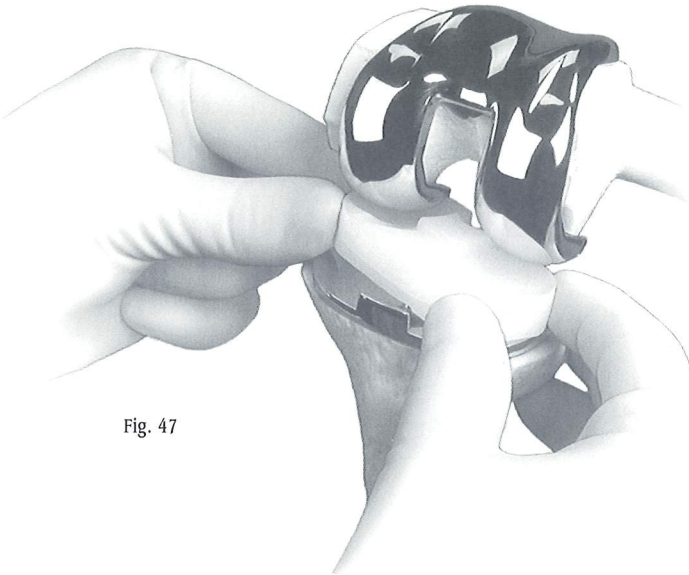


Fig. 47

Fig. 47a

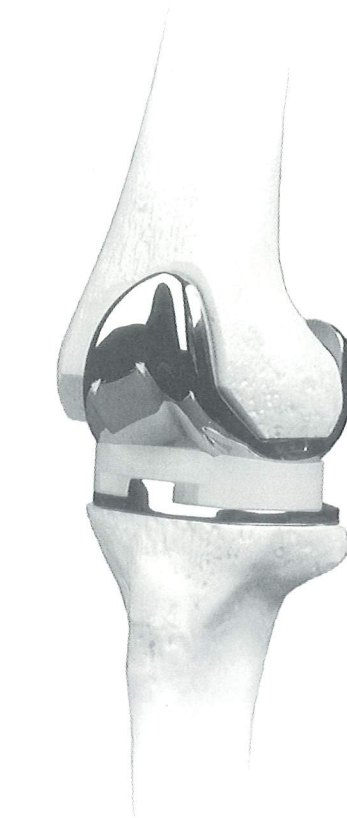
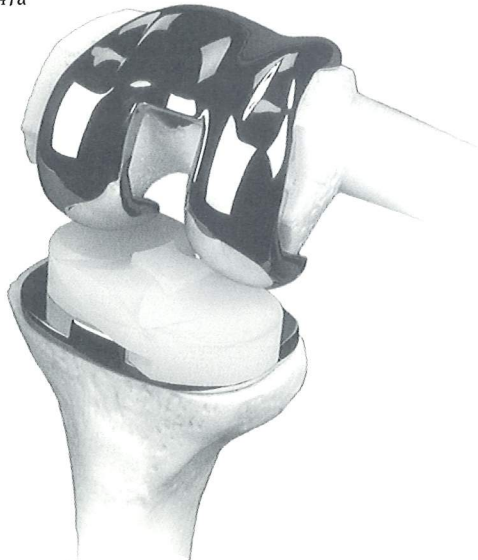


Fig. 47b

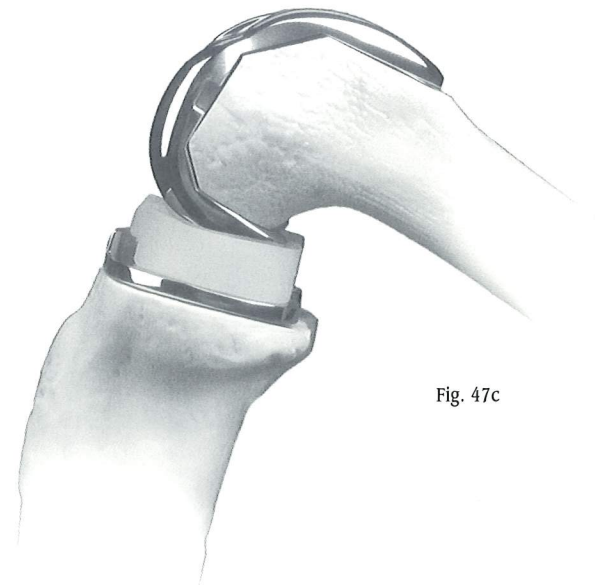
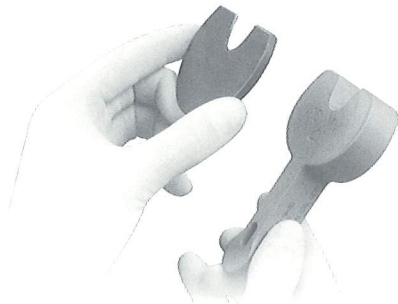


Fig. 47c

MEASURE THE FLEXION AND EXTENSION GAPS

Select the 9mm Spacer/Alignment Guide and assemble the MBK Spacer Adaptor (Fig 48). This adaptor increases the spacer thickness by 2mm. (2mm is the thickness difference between NexGen and MBK components.)

Fig. 48



With the adaptor in place, the 9mm spacer will be representative of the MBK with a 9mm articular surface. With the knee flexed, insert the 9mm Spacer/Alignment Guide with MBK Spacer Adaptor between the resected surfaces of the femur and tibia. Insert progressively thicker Spacer/Alignment Guides with an MBK Spacer Adaptor until the proper soft tissue tension is obtained, (this is defined as

Fig. 49a

very limited A/P motion when pushing and pulling on the tibia). Center the arm of the guide over the tibial tubercle and insert the

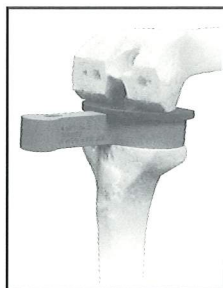
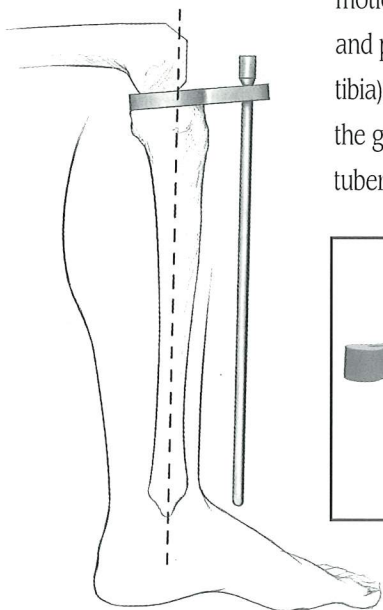
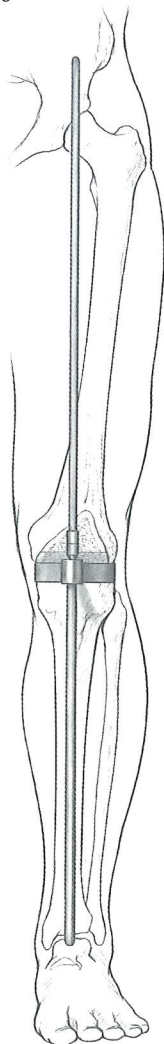


Fig. 49b

Alignment Rod with Coupler through the hole in the arm. The rod should be parallel to the anatomic axis of the tibia (Fig.49a), and the distal end of the rod should be near the center of the ankle, but slightly closer to the medial malleolus.

Remove the Spacer/Alignment Guide and MBK Spacer Adaptor and extend the knee. Reinsert the spacer adaptor and the Alignment Rod with Coupler. With the knee fully extended and the foot dorsiflexed, the distal end of the rod should be slightly closer to the medial malleolus. Attach the

Fig. 50



Alignment Rod extension to the Coupler. The proximal end of the rod should be over the center of the hip joint (Fig. 50).

If the knee is too tight in flexion and extension with the 9mm spacer and adaptor, the proximal tibia should be recut. If the knee is tight only in extension, the distal femur should be recut. If the knee is tight only in flexion, the femoral component should be downsized.

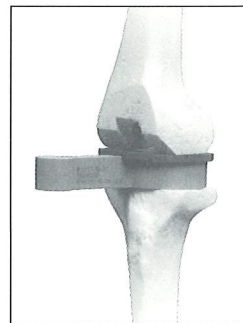


Fig. 50a





DISTAL FEMORAL RECUTTING

The Spacer/Alignment Guide with MBK Spacer Adaptor that was selected for the flexion space should fit comfortably in extension. If the extension space will not accommodate this size of spacer, the distal femur should be recut using the Distal Femoral Recutter.

Note: When the extension space is too tight, it is incorrect to solve this problem by using a thinner spacer block in flexion (i.e. a thinner tibial component when this option is available). A thinner tibial component will give a looser flexion fit that could result in flexion instability or dislocation.

The amount of additional distal femoral resection is determined by using thinner spacer blocks with adaptor in extension. (Use Minus Spacer Blocks with adaptors if necessary.)

The Distal Femoral Recutting Guide provides quick, reproducible results to recut 3 or 5mm of bone. Lay the guide on the anterior cut surface of the femur with the proper "Right" or "Left" engraving facing up. Place pins through the appropriate holes for the amount of additional resection desired (3 or 5mm) and slide the guide proximally until the pins contact the existing distal cut surface. Pin the recutting guide in place with standard or silver spring pins and recut through the slot (Fig. 51).

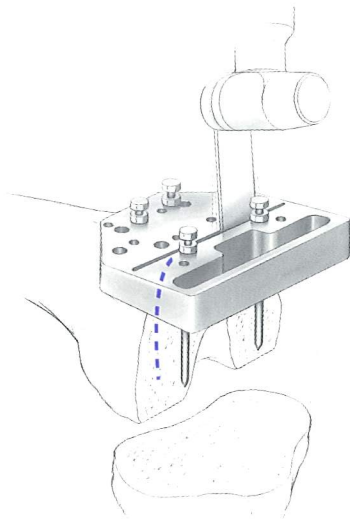


Fig. 51

