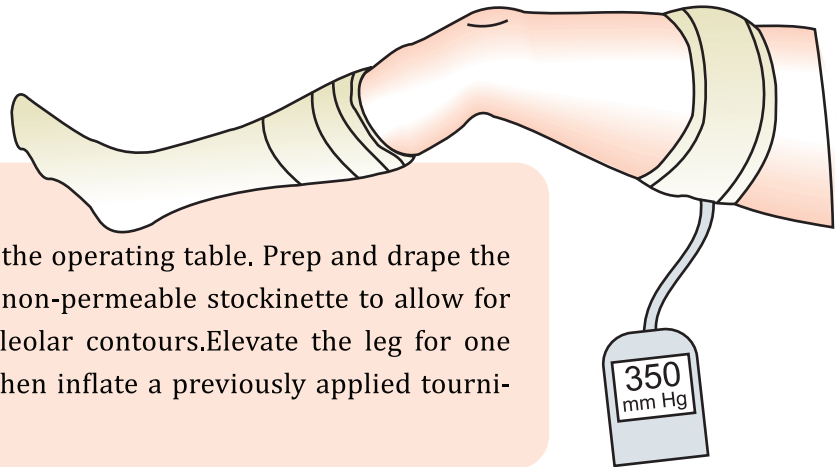


1 Exposure & Releases

Surgical Procedure

Preparation and Draping

Place the patient in a supine position on the operating table. Prep and drape the knee in a sterile fashion. Apply a sterile non-permeable stockinette to allow for palpation of the anterior tibial and malleolar contours. Elevate the leg for one minute to allow for venous run-off and then inflate a previously applied tourniquet.



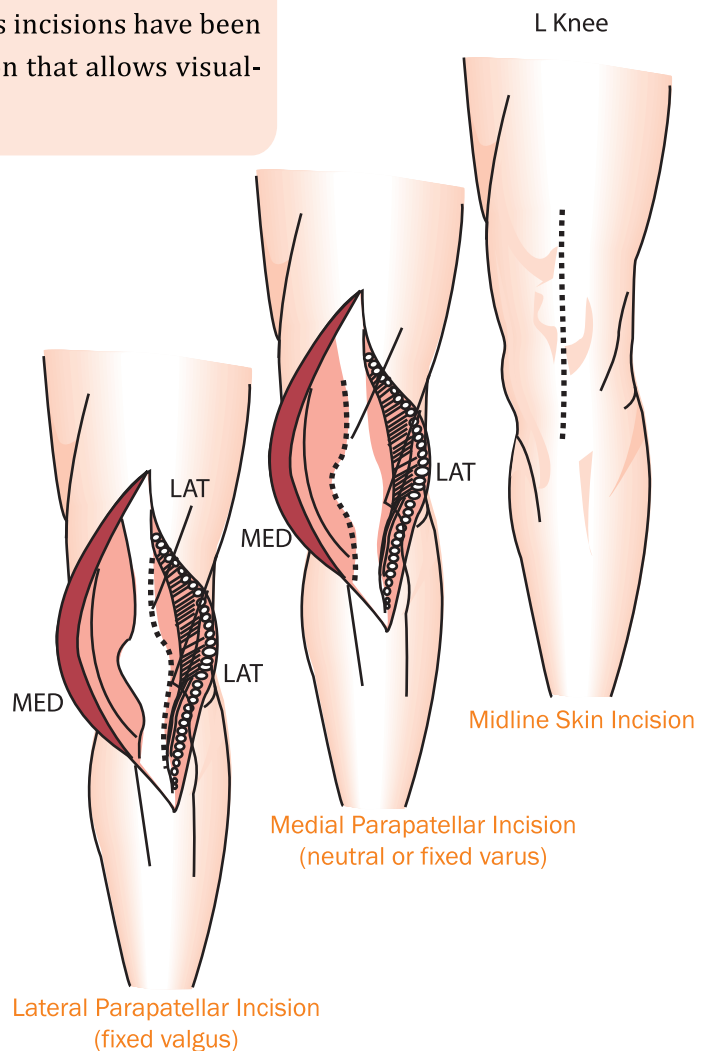
Incisions

Skin Incision:

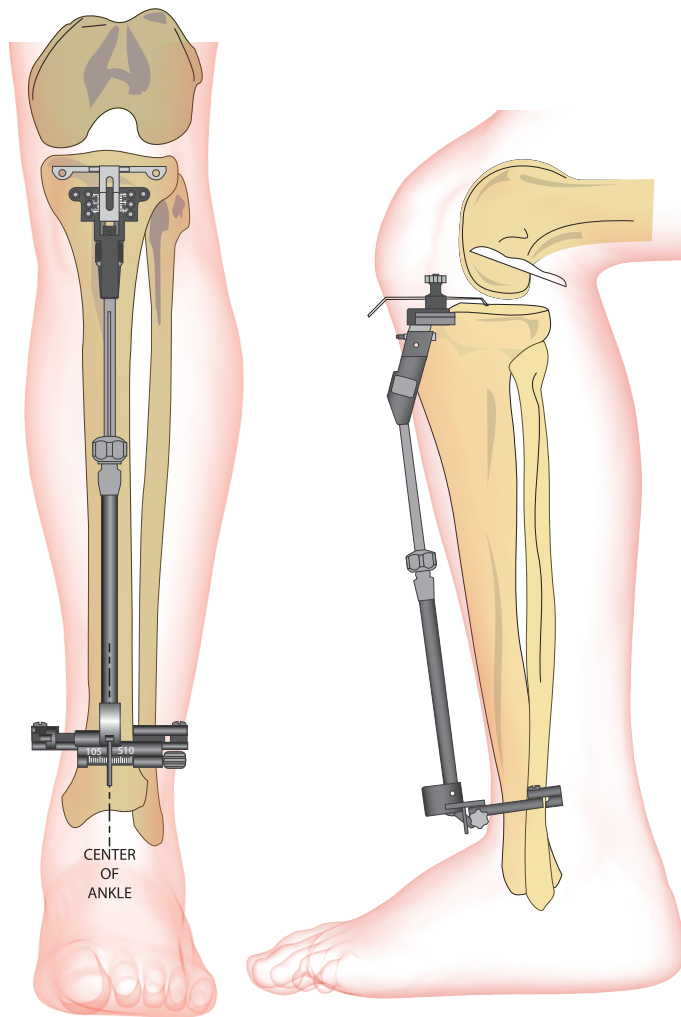
Use a midline skin incision unless previous incisions have been used in which case use the previous incision that allows visualization of the compartment involved.

Deep Incisions:

Use a deep median parapatellar incision for medial compartment arthritis to expose the joint. Perform a medial soft tissue release from the proximal medial tibia if the varus deformity is fixed. In lateral compartment disease and in fixed valgus deformities use a lateral parapatellar incision to gain entrance to the lateral compartment and perform a release of the ilio-tibial tract subperiosteally from the proximal lateral tibia. Should this fail to give complete release of the valgus deformity, proceed to a proximally-based, subperiosteal elevation of the lateral collateral ligament and the popliteus tendon from the distal lateral femur. These sequential approaches for fixed varus or valgus knees should allow the correction of knee alignment to resume that of the mechanical axis.



2 Tibial Resection



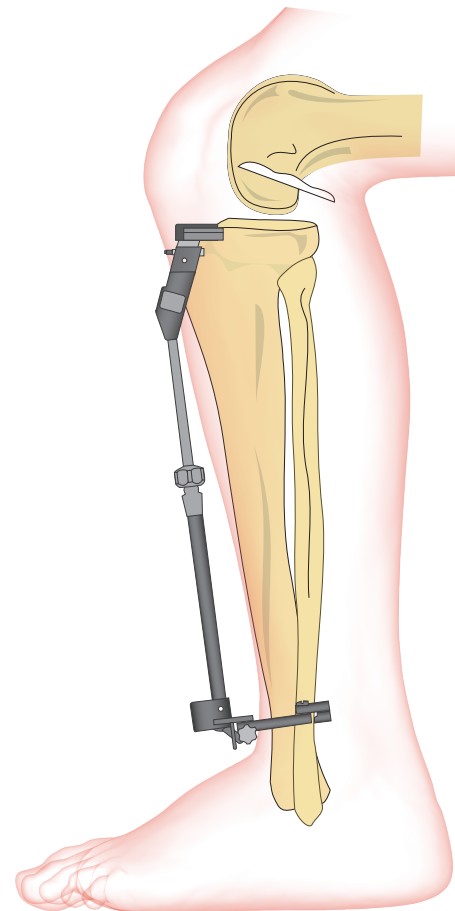
Tibial Resection Guide Orientation

(a) Position the head of the Tibial Resection Guide for proper medial-lateral orientation by centering it in the frontal plane, generally medial to the tibial tubercle and placing it at the approximate level of resection. A Fixation Pin is then placed midway in the central slot to help stabilize the Guide.

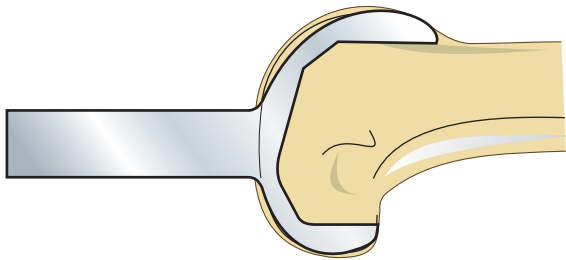
Note: Pre-drill all Fixation Pin holes with a 1/8" drill bit to allow easy pin insertion into hard bone.

(b) Place the distal end of the shaft of the Guide in the medial-lateral direction just lateral to the Tibial is anterior tendon, which approximates the ankle joint center (5-8 mm medial to the transmalleolar axis). Place the shaft end in the anterior posterior direction, to provide physiologic posterior inclination cut in the lateral plane. (An ankle clamp is available, if desired, to stabilize the distal Guide end.)

(c) The entire Guide is then moved in the vertical direction to the desired level of tibial resection, and pinned in place using two Fixation Pins as shown. The Capture Plate may be used to help guide the blade if desired. After performing the tibial resection remove the Tibial Resection Guide, but not the Fixation Pins. The Fixation Pins may be needed later to adjust this resection level.



3 A-P Femoral Resection



Femoral Sizing

Resect all femoral osteophytes so that the normal femoral shape can be visualized. Using the Femoral Template, select the size that best approximates the bony (not the articular cartilage) profile of the lateral femoral condyle. This is the correct size of the femoral component and is used to select the appropriate A-P Femoral Resection Guide.

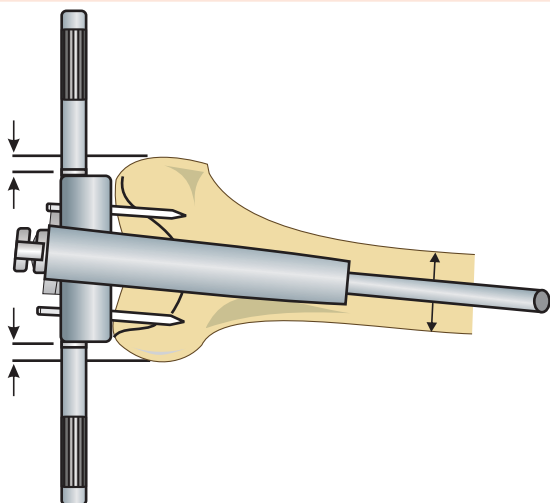
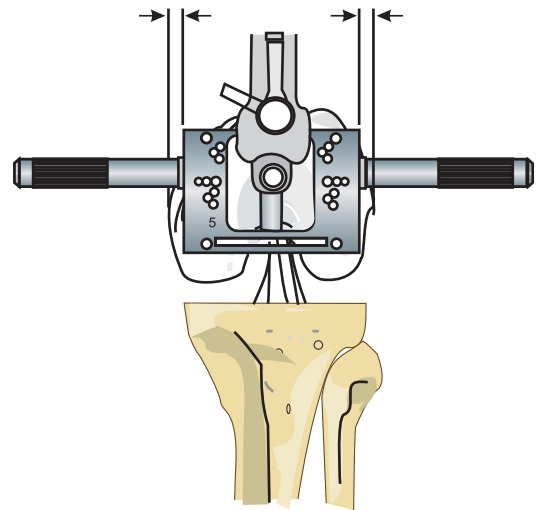
Note: An error in sizing will effect joint line and ligament function. A size that is too large will result in an inferior displacement of the joint line and excessive tibial resection. A size that is too small will result in a superior displacement of the joint line and excessive femoral resection.

Femoral Resection

Assemble and lock the Femoral Guide Yoke onto the appropriate size A-P Femoral Resection Guide. This will automatically set the Femoral Guide Yoke at the "SHAFT LEVEL" mark and will insure that the anterior resection is made at the level of the anterior femoral cortex.

Center the Femoral Resection Guide between the femoral epicondyles, and the Femoral Guide Yoke with respect to the femoral shaft.

The Femoral Resection Guide is the same width as the Femoral Component, Check that the Guide does not overhang the femoral articular surface excessively. If it does, consider selecting a smaller femoral size.



Partially stabilize the Femoral Resection Guide using two or more Fixation Pins. If a revision instrument requiring the use of a Bone Pin for axial rotational positioning is contemplated insert a Pin in one of the horizontal hole sets centered on the Drill guide Hole.

3 A-P Femoral Resection

Keep the Femoral Guide Yoke centered on the femoral epicondyles and drill a long 9 mm hole up the shaft of the femur. This step establishes the flexion orientation of the femoral component.

The 9 mm hole should be adjacent to the intercondylar notch, usually 3-5 mm medial to the apex.

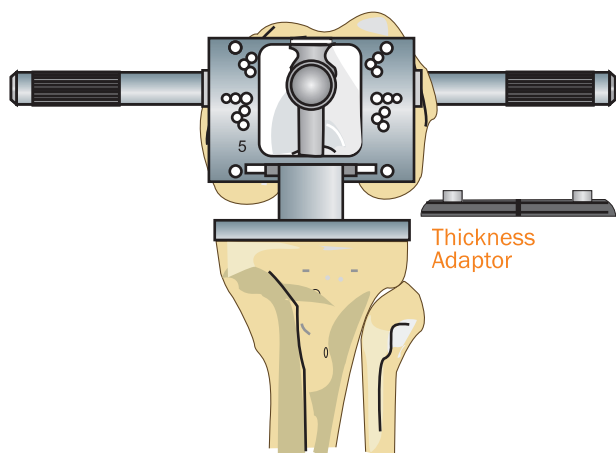
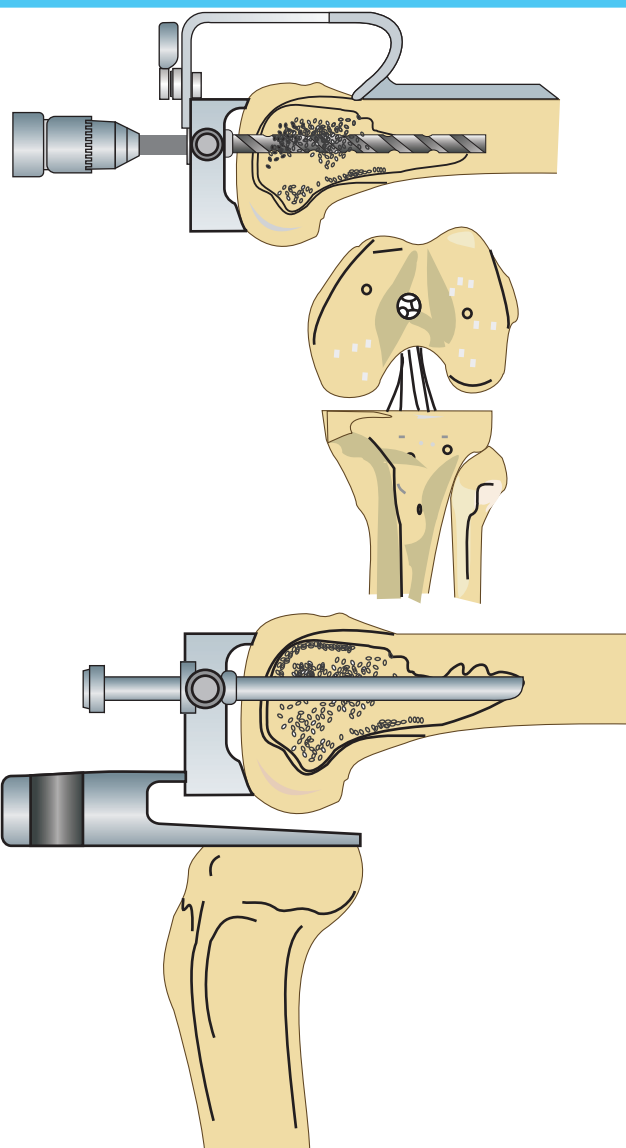
Remove all instrumentation except the two outside Fixation Pins in the tibia.

Insert the I/M Rod into the appropriate A-P Femoral Resection Guide and place the rod up the femoral shaft drill hole.

Insert the Femoral Guide Positioner into the slot in the Femoral Resection Guide and onto the resected surface of the tibia.

The function of the Positioner is to reproduce the flexion gap and balance medial and lateral ligamentous tension. This will axially position the A-P Femoral Resection Guide so as to produce balanced flexion tension and proper axial plane alignment.

If the Positioner is too tight, the tibial resection is too high. In this case, drop the Tibial Resection Guide to the next set of holes to engage the Fixation Pins at a lower level and redo the tibial resection. Otherwise remove the Fixation Pins.



If the joint is loose in flexion install a Thickness Adapter onto the inferior surface of the Femoral Guide Positioner. Select the Adapter thickness that provides the best approximation to normal flexion tension of the ligaments. The designation of the Adapter will most likely indicate the thickness of the bearing that will be used.

Note: The final thickness of the Femoral Guide Positioner and Thickness Adapter producing the proper ligament tension will most likely indicate the thickness of the bearing that will be used and must be used with the Spacer Block to be employed later

3

A-P Femoral Resection

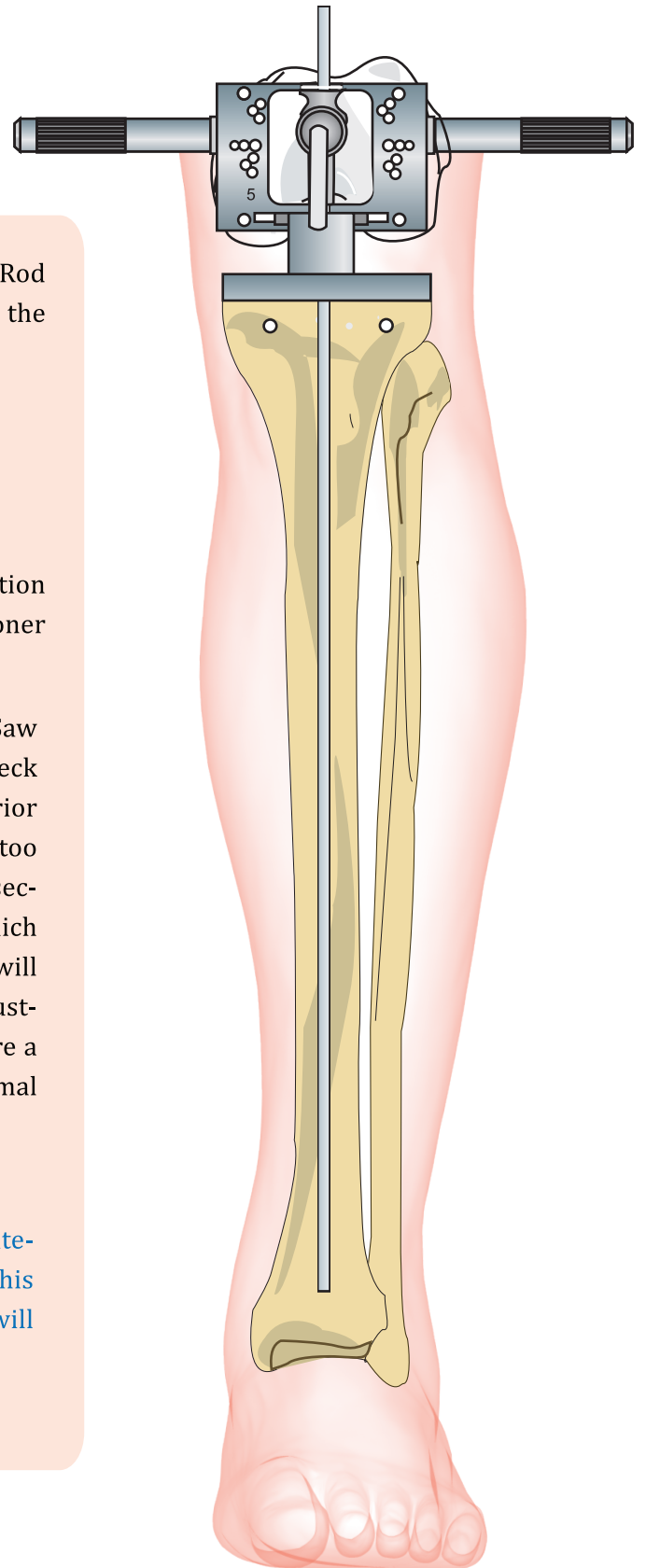
Check the tibial resection using the long Alignment Rod inserted into the Femoral Guide Positioner. Correct the tibial resection, if necessary, before proceeding.

The Alignment Rod is useful for rocking the Femoral Guide Positioner to determine flexion tension in each compartment.

If the tibial resection is correct, and balanced ligament tension is achieved, pin the A-P Femoral Resection Guide using two Fixation pins, and remove the Positioner and Alignment Rod.

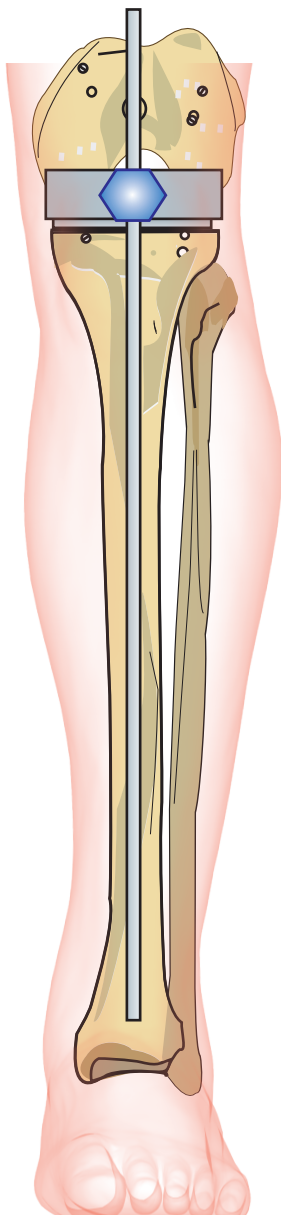
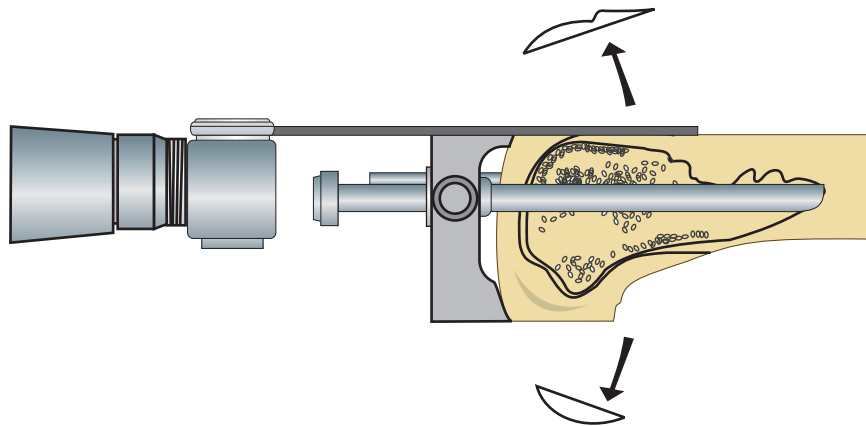
First perform the anterior femoral resection. The Saw capture may be used to help guide the blade if desired. Check that the resection is flat and at the level of the anterior aspect of the femoral shaft. If the anterior resection is too high, remove the I/M Rod and drop the A-P Femoral Resection Guide. Do this by selecting a new set of holes into which the fixation pins are engaged, so that the new resection will be approximately at the shaft level. This resection adjustment condition will affect the flexion gap and will require a similar amount of resection adjustment of the proximal tibia.

Note: Take care that the anterior resection is flat. The anterior resection surface is a basic reference surface for this procedure and errors in the preparation of this surface will produce errors in all subsequent femoral resections.



3

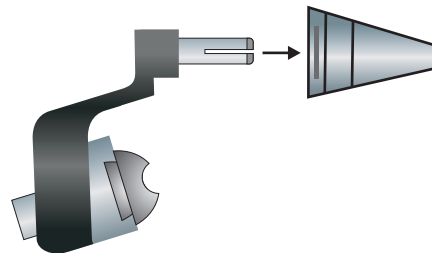
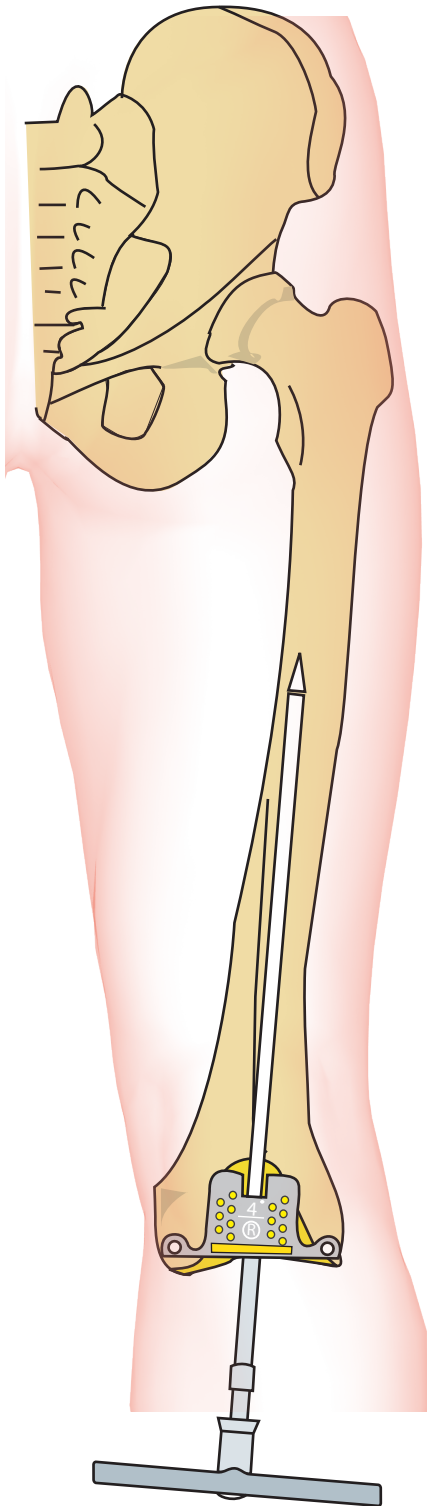
A-P Femoral Resection



After making a proper anterior resection resect the posterior femoral condyles. More condyle will typically be resected on the medial side.

Check flexion tension and alignment, using an appropriate size Spacer Block and the Thickness Adapter used with the Femoral Guide Positioner to reapproximate the flexion prosthetic gap. Adjust the tibial resection, if necessary. Perform or adjust releases for equal compartment tension, if needed and adjust for overall tension using the appropriate Thickness Adapter

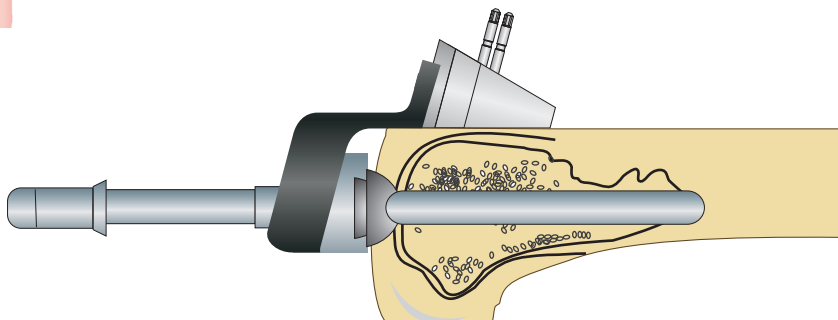
4 Distal Femoral Resection



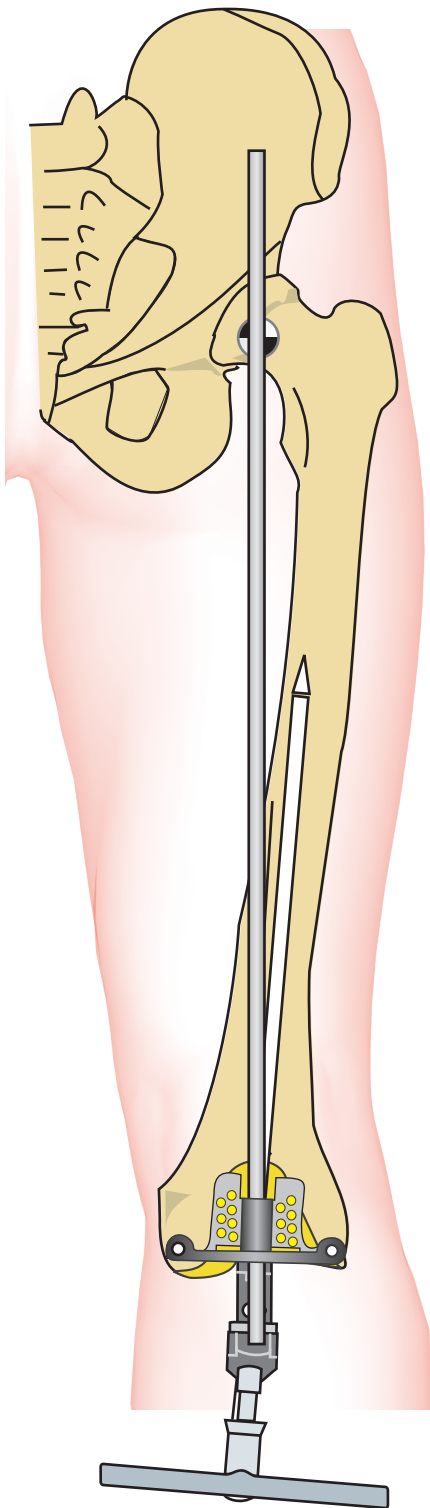
Insert the Distal Femoral Resection Guide Positioner into the Distal Femoral Resection Guide with the desired angle.

Insert the I/M Rod with T-Handle into the Distal Femoral Resection Guide Positioner.

Insert the I/M Rod into the femur. Place the Distal Femoral Resection Guide on the distal femur flat against the anterior femoral resection. Place the floating Button on the positioner against the femoral intercondylar notch.



4 Distal Femoral Resection



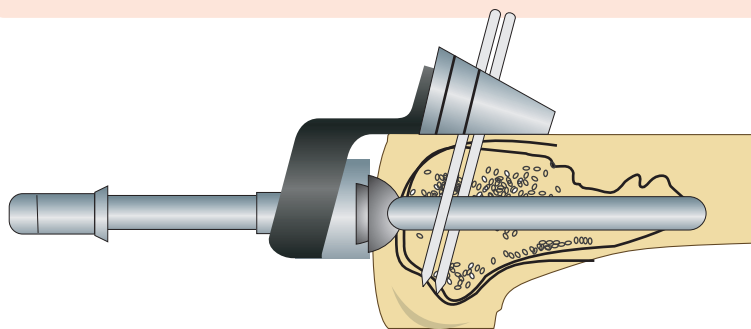
Recommended Valgus

The true tibiofemoral Valgus Angle of the normal opposite knee should be used when possible. Otherwise use the following angles. These recommended angles are a function of the patient's height and are:

| | |
|----------------------|----|
| Height < 180cm | 5° |
| 180 < Height < 193cm | 4° |
| Height > 193cm | 3° |

Short, obese patients may require a smaller valgus angle to keep their thighs from rubbing.

The Alignment Tower may be used with the Alignment Rod to check the selected tibiofemoral valgus angle against the femoral head center

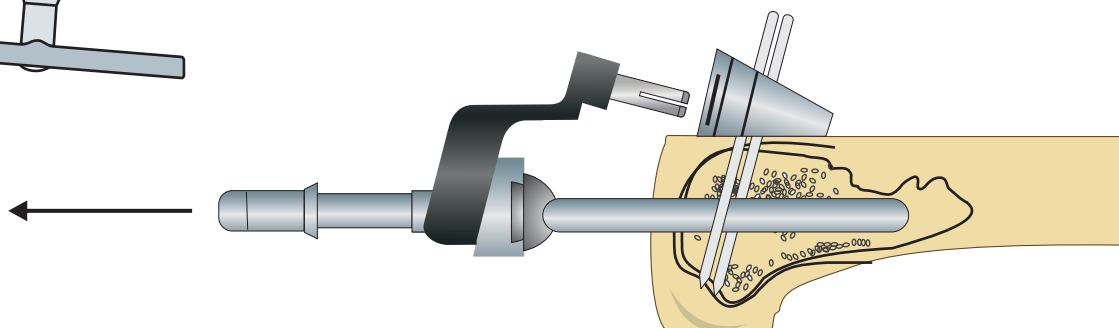


Make certain that the Distal Femoral Resection Guide is flat on the anterior femoral resection surface.

Note: If it is not, the remaining femoral cuts may be incorrectly oriented, producing a poor femoral component fit.

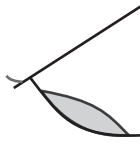
Place two Fixation Pins through the guide holes in the Distal Femoral Resection Guide into the anterior femoral resection surface.

Remove the Distal Femoral Guide Positioner and I/M Rod leaving the Distal Femoral Resection Guide in place.



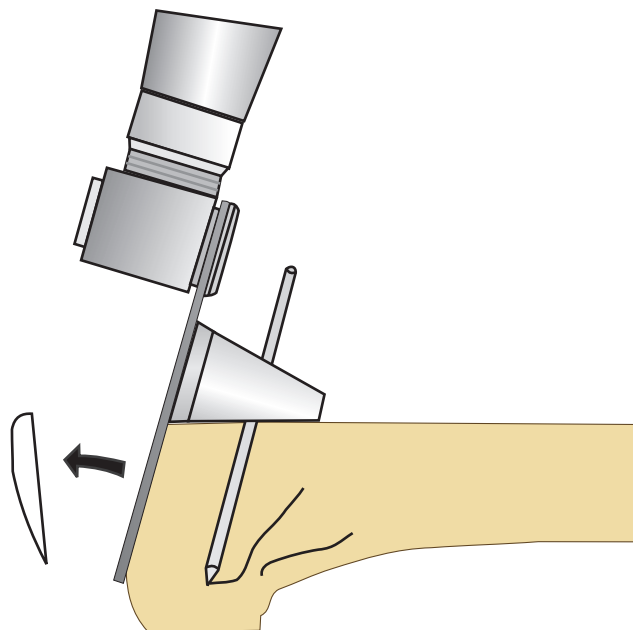
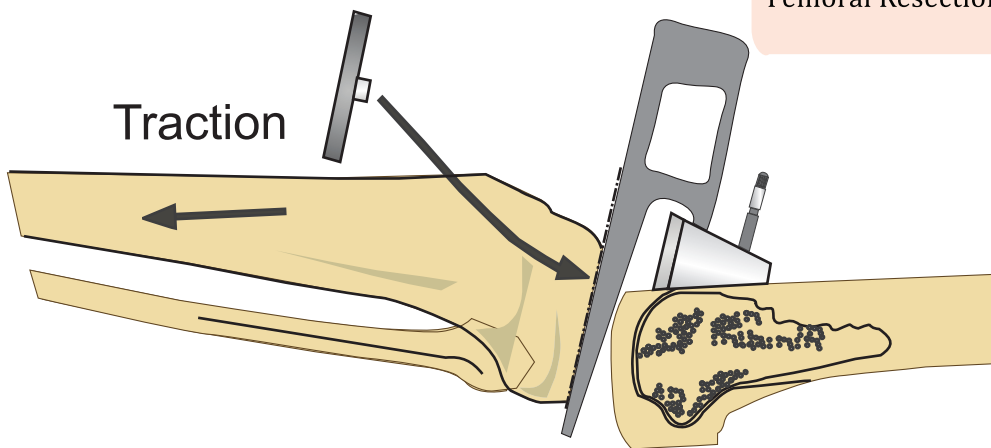
4 Distal Femoral Resection

If a Thickness Adapter was used with the Femoral Guide Positioner to establish proper flexion tension, then use the same adapter with the Femoral Guide Positioner.



Fully extend the tibia and apply traction simulating normal ligamentous tension.

Place the Femoral Guide Positioner into the joint space and into the slot in the Distal Femoral Resection Guide.

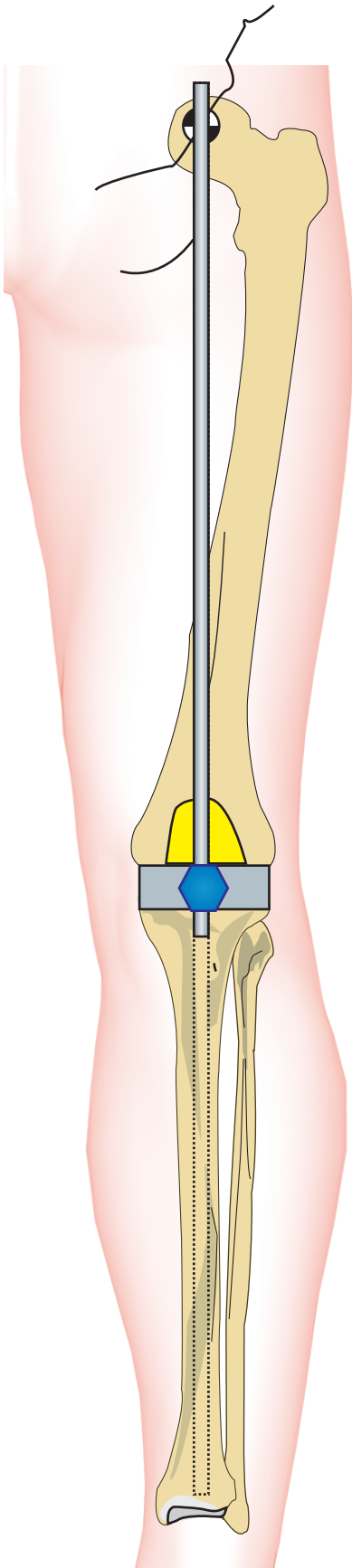


Sight along the inferior surface of the Femoral Guide Positioner to determine if the interior edge of the Positioner (or Thickness Adapter) is aligned with the tibial resection. If it is misaligned by more than 1.5mm, move the Distal Femoral Resection Guide so that the Fixation Pins are in a new set of holes that will produce a proper extension gap.

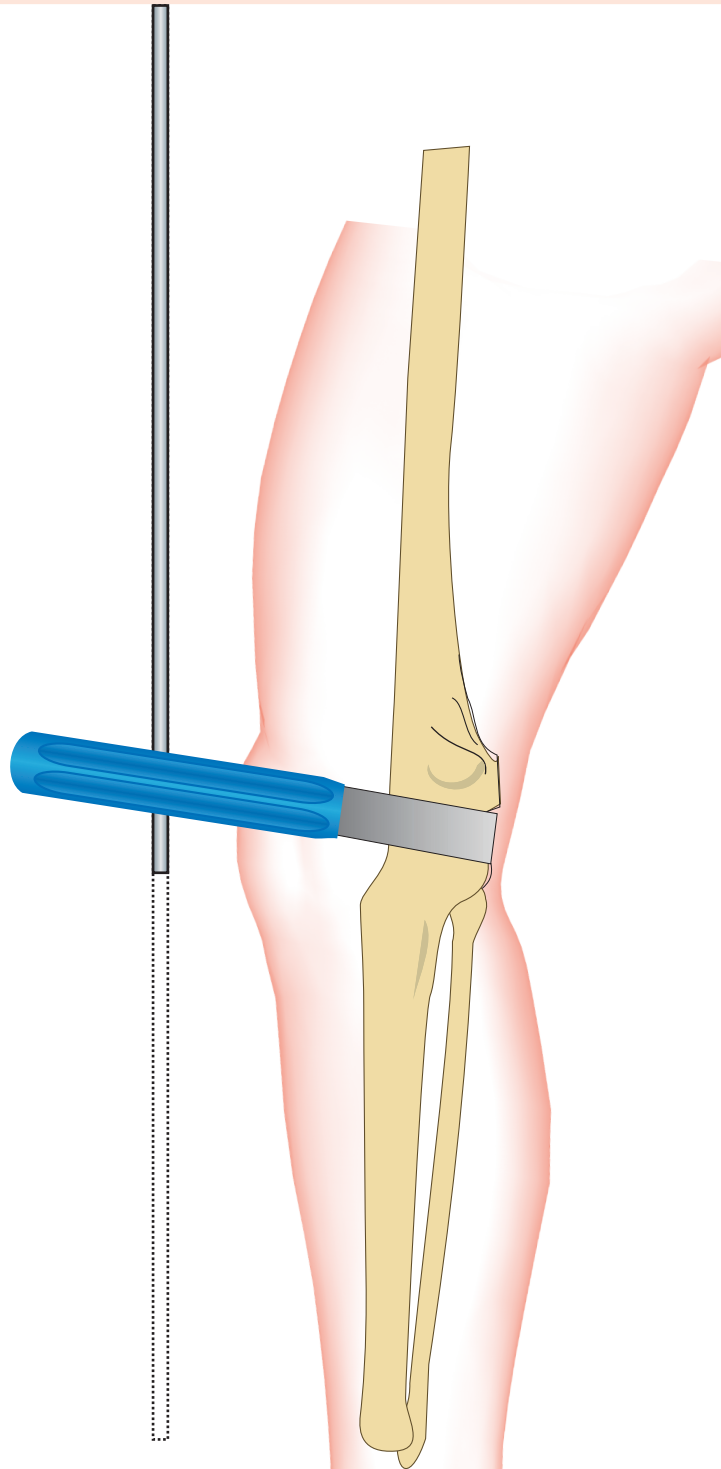
Perform the distal femoral resection using the Distal Femoral Resection Guide. The Capture Plate may be used to aid the resection.

Note: Make sure that this resection is flat. Errors in this cut will generate errors in the subsequent femoral resections.

4 Distal Femoral Resection

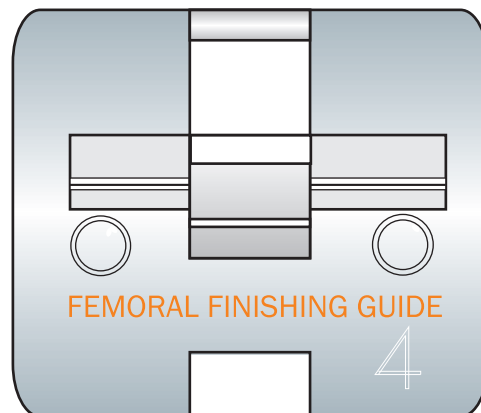


Check extension tension, and limb alignment using the Spacer Block, and Thickness Adapter used to determine the distal femoral resection level and reapproximate the extension prosthetic gap. In making any resection adjustments, note that the extension gap must be equal to the flexion gap.



5 Femoral Finishing Resections

Center the Finishing Guide between the epicondyles.



Drill two 6mm holes about 20mm deep through the guide holes in the Resecting Guide.

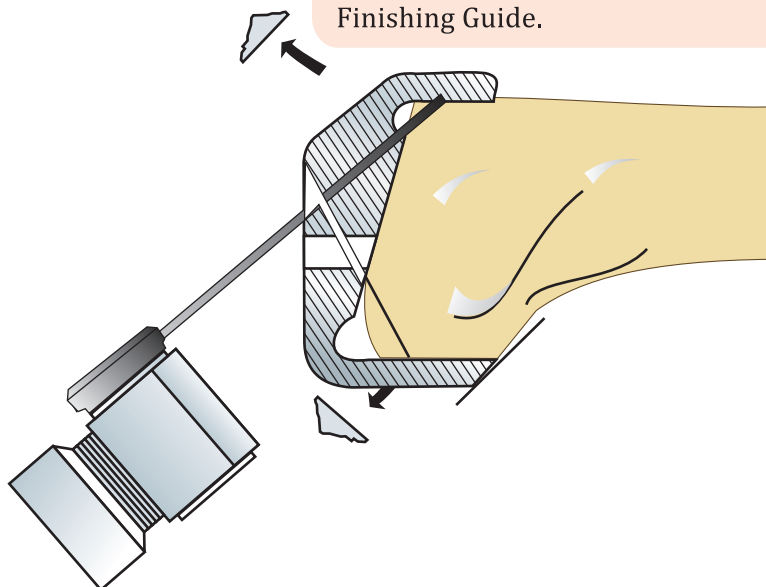
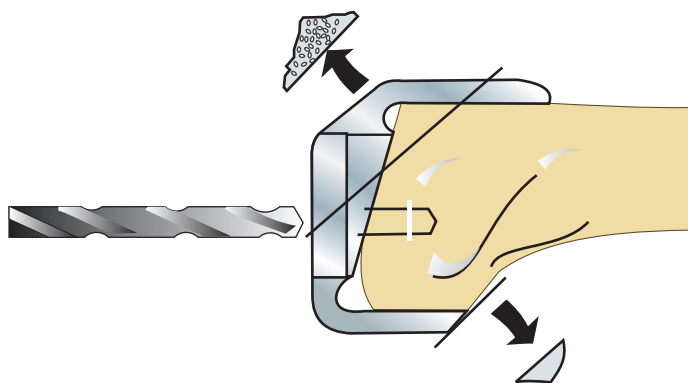
Perform the anterior recessing resection using the 20 mm osteotome.

Perform the posterior recessing resections with an osteotome or power saw.

The posterior recessing resections are needed to avoid impingement between the bearing and the femur during deep flexion.

Note: In performing these resections take care not to notch the posterior femoral shaft.

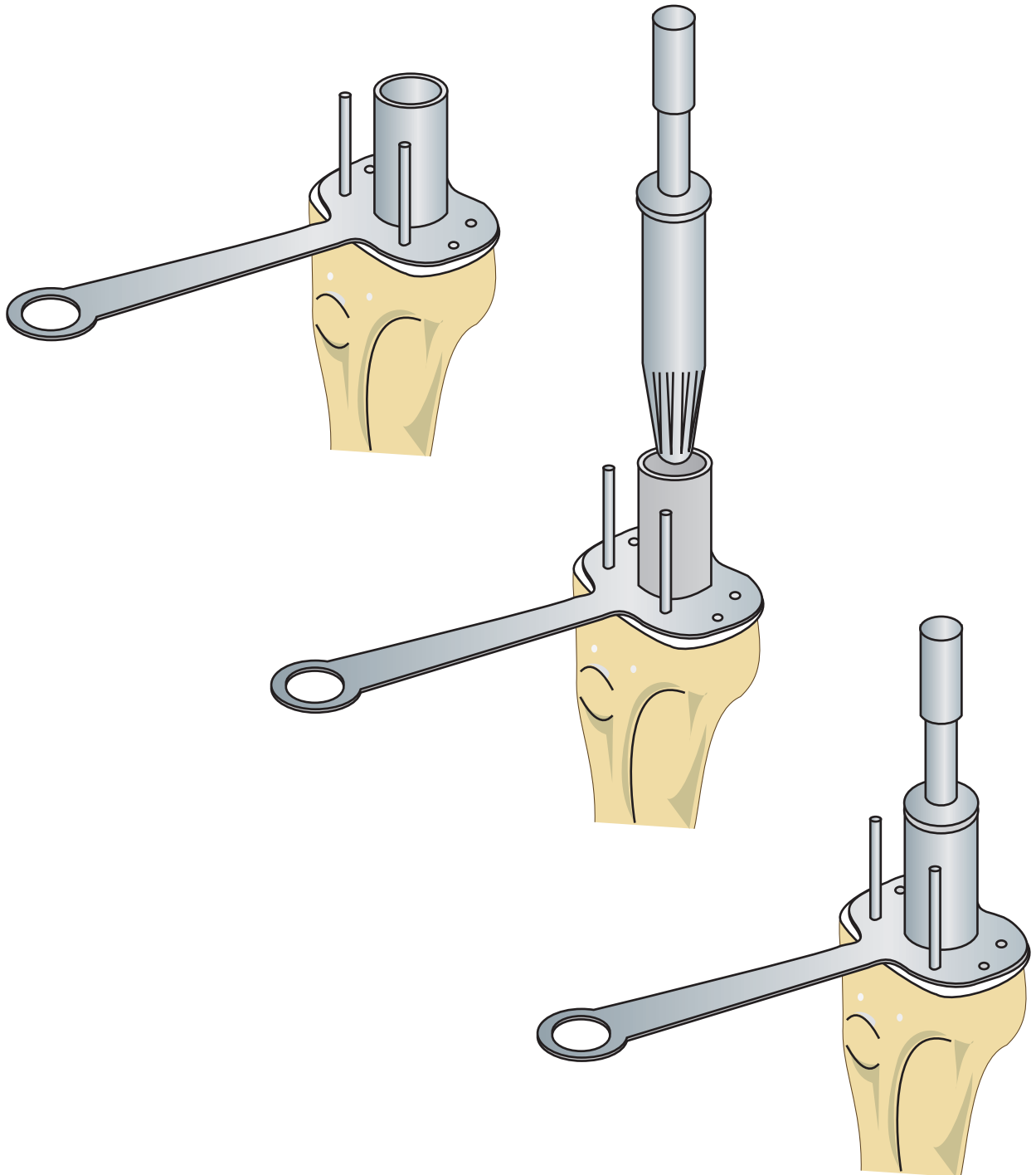
Perform the anterior and posterior oblique resections using the guide slots in the Finishing Guide.



6 Final Tibial Preparation

Align the correct size Tibial Reamer Guide Template for best bony coverage. Pin the guide in place using the Fixation Pins. Ream the hole for the plateau stem using the conical Tibial Reamer.

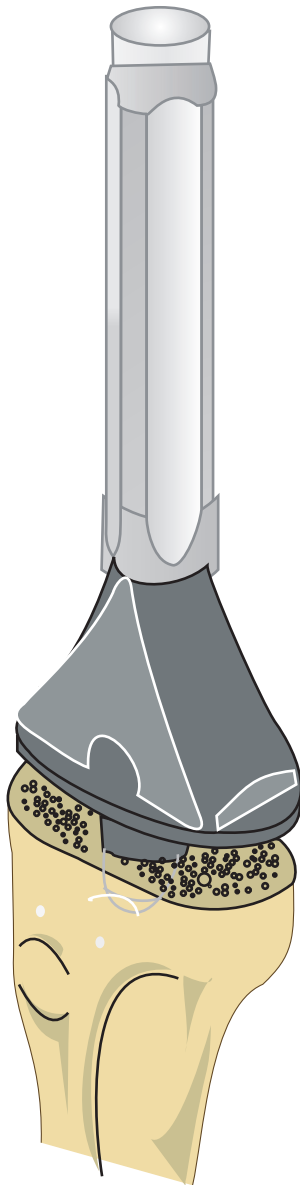
Warning: In severely sclerotic bone a curved gouge may be needed to start the hole.



7 Trial Reduction

Insert and impact the appropriate size trial tibial component using the impactor.

Note: If augmented fixation by means of stem extensions is needed modular femoral and tibial components are available. Refer to TTK's Buechel Pappas Revision Knee System Surgical Procedure for a description of these components and their use.



PROPERLY POSITIONED

Ensure that the tibial surface is properly covered and aligned. If not adjust the position of the trial tibial component. The tibial components are aligned for the best bony coverage as shown below.

Axial alignment of the Tibial Component with respect to the direction of normal gait is unnecessary. Such misalignment is accommodated by the Rotating Bearing.

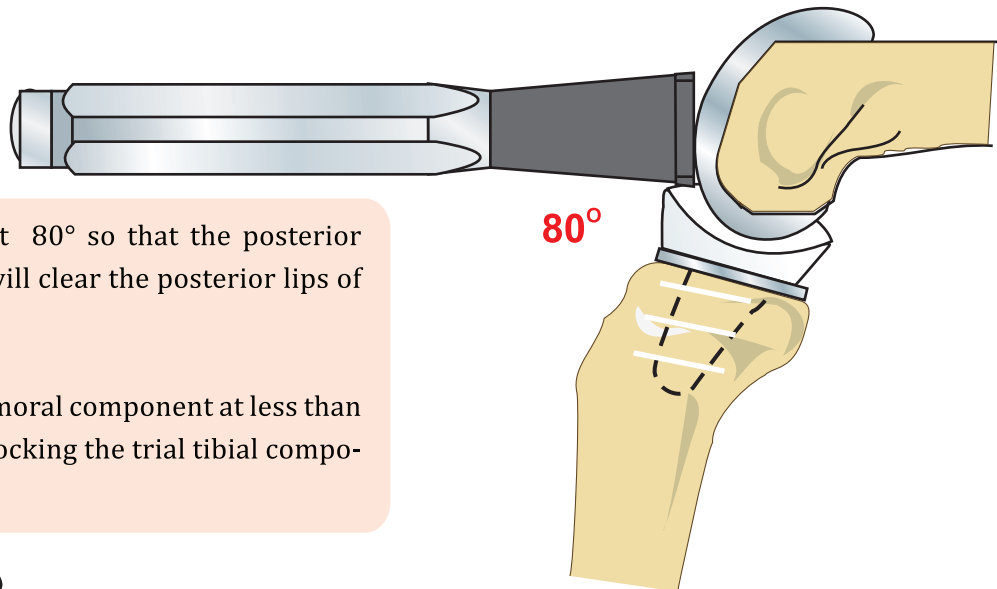
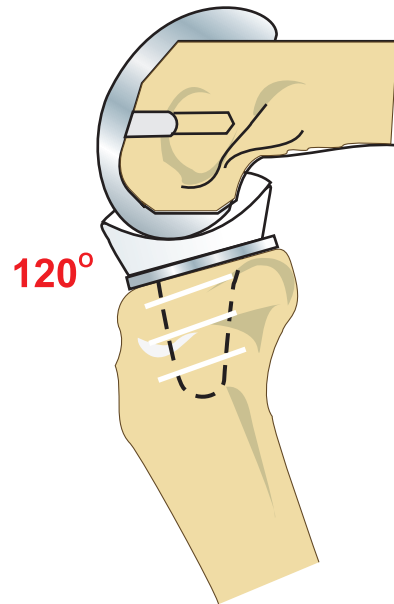


IMPROPERLY POSITIONED

7 Trial Reduction

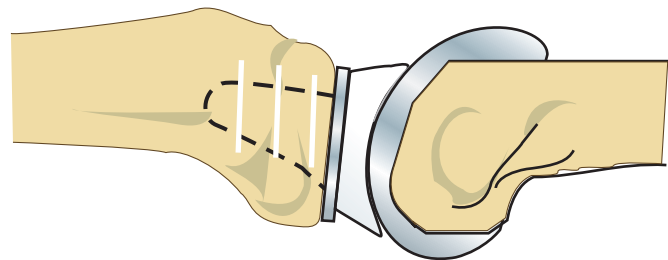
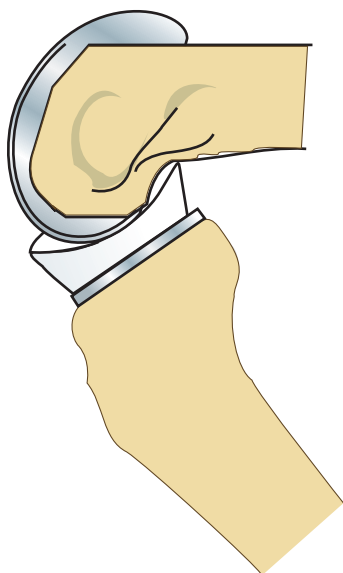
Insert the trial Rotating Bearing. Flex the leg to about 120° , to allow the posterior trial femoral condyles to clear the anterior lip(s) of the Bearing and digitally insert the trial femoral component on the distal femur.

Note: In tight knees, hold the Bearing in place and bring the knee into extension to allow the Bearing to reduce under the posterior femoral cut. Then flex the knee to insert the femoral component.



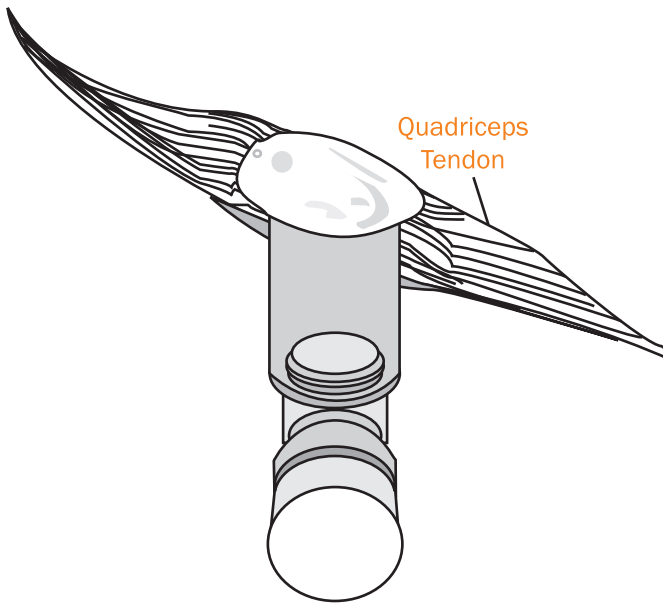
Extend the leg to about 80° so that the posterior trial femoral condyles will clear the posterior lips of the trial bearing.

Fully impact the trial femoral component at less than 90° of flexion to avoid rocking the trial tibial component.



Check the range of motion of the knee, while looking for free bearing motion and absence of impingement. If these are not present, correct at this time.

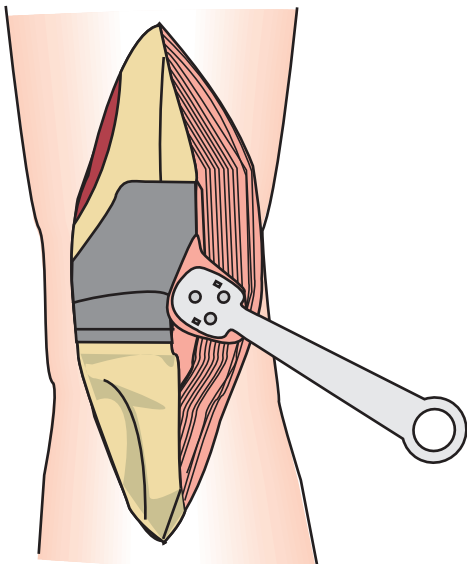
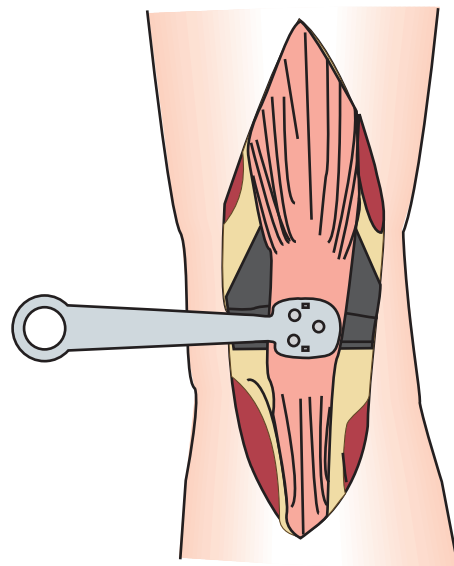
8 Patellar Preparation



Resect the patellar surface, at and parallel to, the level of the quadriceps tendon using an oscillating saw. Ensure that the resected surface is flat and the patella thickness is uniform. This thickness should generally be 12-14mm.

Note: Take care not to resect below the level of the tendon, as this will excessively weaken the patellar bone bed.

Reduce the resected patella and orient the Patella Template corresponding in size to the femoral size chosen against the resected surface. Place the Patella Template perpendicular to the tibial axis.

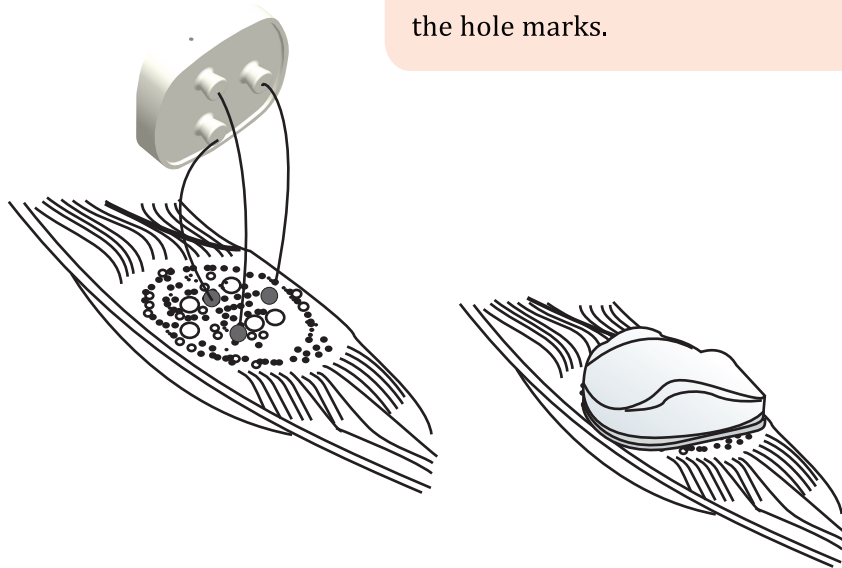


Evert the patella and the Patella Template on the resected surface with the plate centered on the bone bed. The handle will usually lie approximately 30° downward from the perpendicular to the tibial axis. Mark this position with a cautery or a marking pen.

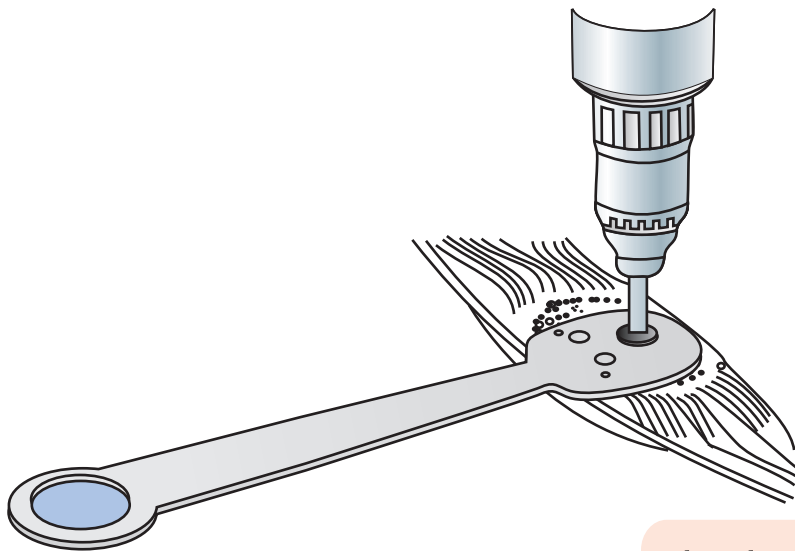
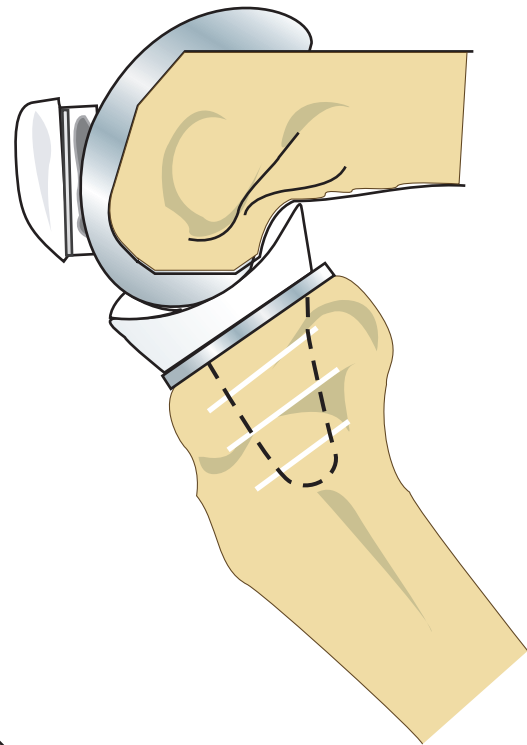
8

Patellar Preparation

Press the Patella Trial component onto the resected patellar surface with the pins located at the center of the hole marks.



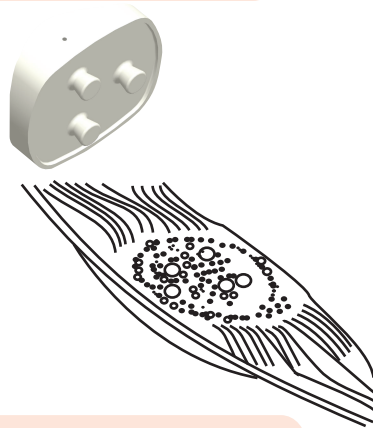
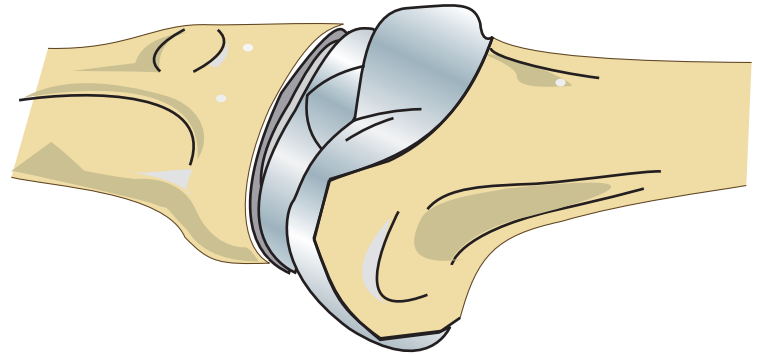
Reduce the patella and evaluate the patellar tracking. If necessary adjust the position of the trial or perform a lateral release to obtain central tracking in the femoral groove.



Align the appropriate size and type patellar template with the marking on the resected patellar surface. Ensure that the Template is flush. Prepare the fixation holes using the Patella Drill.

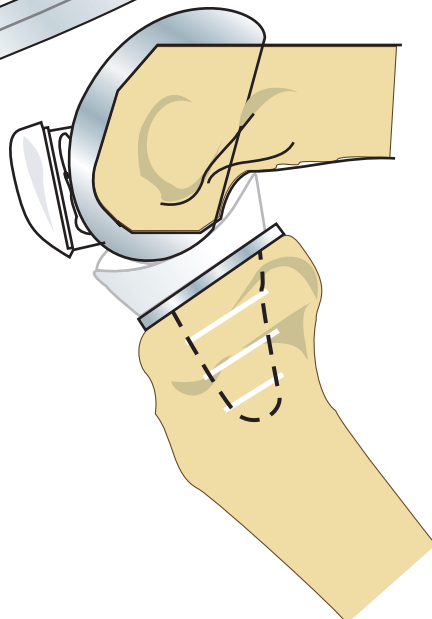
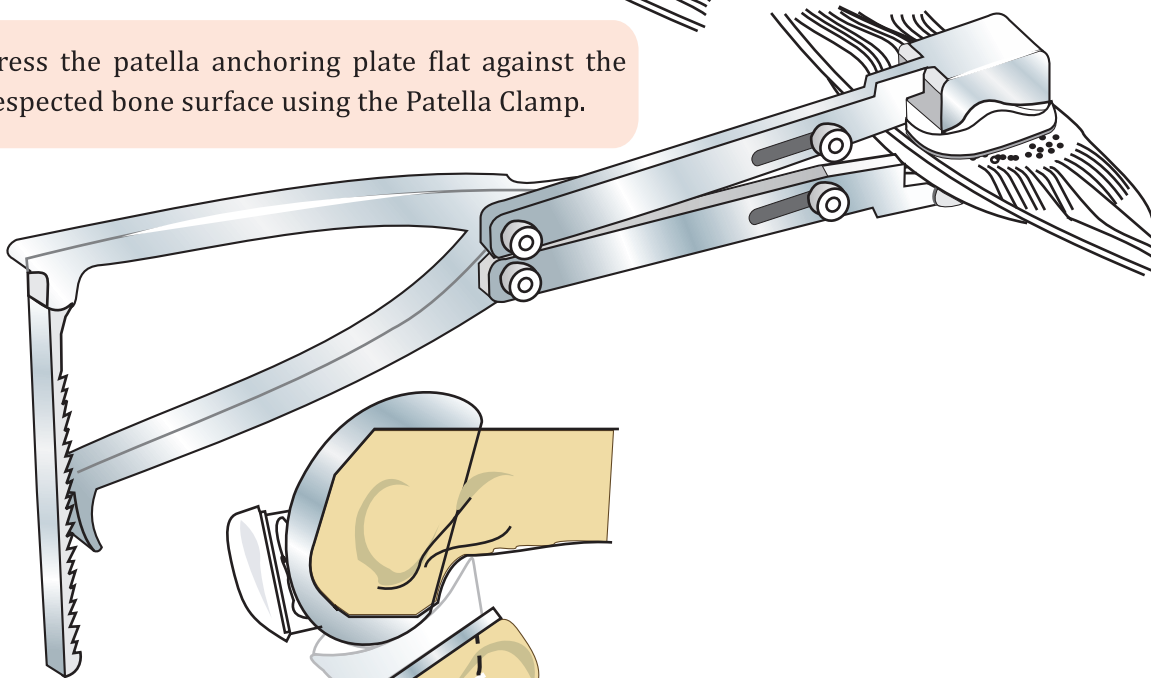
9 Component Implantation

Implant the appropriate tibial component, bearing and femoral component using cement, and or impaction, as appropriate, in the same order and manner as the trials



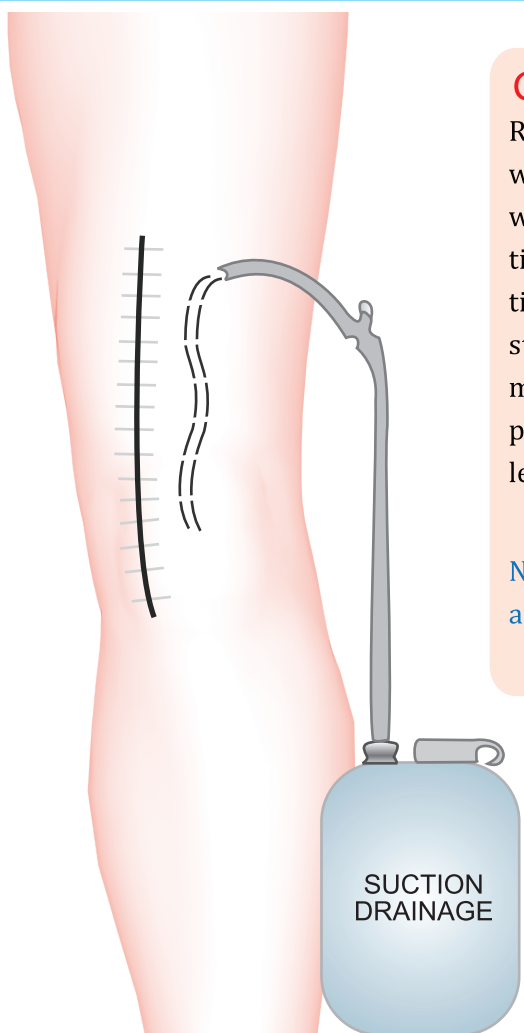
Insert the fixation pegs of the Rotating Patella Component into the holes in the resected patellar surface.

Press the patella anchoring plate flat against the resected bone surface using the Patella Clamp.



Reduce the patella and evaluate the implants. Ensure that an unrestricted range of motion, free bearing movement and proper patella tracking are present.

Closure and Post-Operative Management



Closure

Release the tourniquet and copiously irrigate the wound with antibiotic saline solution. Check motion with the tourniquet down. Close the deep retinacular tissues using #1 absorbable suture, the subcutaneous tissue with a 2-0 absorbable suture and the skin using staples or a vertical mattress suture. A suction drain may or may not be used. Apply a Robery Jones Compression dressing to the extremity followed by a long leg knee immobilizer.

Note: If pressure is needed to gain full extension, apply a long leg cast to hold full extension for 48 hours.

Post - operative Care

The Patient may be out of bed on the first post-operative day and should begin isometric quad setting exercises of at least ten per hour. Remove suction drains, if used, after 48 hours. The patient may transfer with weight-bearing to tolerance on the first post operative day and may begin gravity-assist and active-assistive range of motion. Should wound healing be a problem, then defer flexion until the wound quality appears satisfactory. An anticoagulation program should be considered, beginning on the first postoperative day (13).

Perform physical therapy, consisting of progressive ambulation with weight bearing to tolerance, daily for the first two weeks and then three time weekly over the next four weeks. Knee swelling may persist consistent with the rehabilitation status of the quadriceps mechanism. Post operative swelling with a well-functioning quadriceps generally subsides within 6-12 weeks following knee replacement. Isometric quad setting exercises should be continued until knee effusion (swelling) has subsided. Once this effusion has subsided, progressive resistive quadriceps exercises should begin to improve strength and endurance necessary for normal gait.