



P.F.C.® SIGMA KNEE SYSTEM



PRIMARY

CRUCIATE-RETAINING AND

CRUCIATE-SUBSTITUTING

PROCEDURES

Prostheses Designed by

Cruciate-Retaining Prosthesis

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Specialist[®] 2 Technique

Introduction

Total knee replacement is performed on a range of patients, of all ages, with various pathologies and anatomical anomalies. As no single arthroplastic approach is appropriate for every knee, the surgeon must be prepared, as the situation indicates, to preserve or substitute for the posterior cruciate ligament. PCL sacrifice is indicated in patients with severe deformity, profound flexion contracture and in the greater number of revision cases. Most primary and some relatively uncomplicated revision cases are suitable cruciate-sparing procedures. Where the ligament is to be preserved, it is essential that its balance in flexion be confirmed.

The P.F.C.[®] Total Knee Systems were designed as comprehensive approaches allowing intra-operative transition from PCL retention to PCL substitution. The major difference in the design for the two prostheses is the incorporation of an intercondylar post in the PCL substituting tibial insert and its corresponding intercondylar receptacle in the femoral component, to compensate for the stabilising restraint of the PCL. They were also designed to provide greater restraint in cases of revision surgery, and to meet the most demanding clinical and institutional requirements.

A single integrated set of instruments, the Specialist[®] 2 Instruments, was designed to assure fully accurate bone resection and to accommodate most surgical techniques and contingencies.

Criteria For Successful TKR

Appropriate Sizing of Components

This is attained through critical approximation of the A/P dimension of the femoral component to the lateral femoral profile. Undersizing will create looseness in flexion and possible notching of the femoral cortex. Oversizing will create tightness in flexion and increased excursion of the quadriceps mechanism.

Accurate Component Alignment

This is assured by resection of the distal femur in the appropriate degree of valgus as determined by pre-operative evaluation, and resection of the proximal tibia at 90° to its longitudinal axis.

Soft-Tissue Balance

This is realised through the careful sequential release of medial constraining elements in varus deformity and lateral structures in valgus.

Accurate Patellar Tracking

This is effected through accurate positioning of the femoral and tibial components, precise resurfacing of the patella, careful trial evaluation and, where indicated, lateral retinacular release.

Dependable Cement Fixation

This is achieved through controlled technique that ensures the establishment of comprehensive bone/cement/prosthesis interlock.

Balancing the Knee

The appropriate level of prosthetic constraint is determined through pre-operative evaluation subject to intra-operative confirmation. Where soft-tissue constraint is identified, the system is designed to effectively address it.

Primary Cruciate-Retaining TKR

A posteriorly lipped insert is employed, designed for situations where the PCL is functionally intact. Where there is tightness in the PCL, a posterior cruciate recession is indicated (see Appendix I).

Primary Cruciate-Supplementing TKR

A curved insert is used with improved contact area to supplement the PCL where the ligament has sufficient functional laxity to accommodate the greater conformity.

Primary Cruciate-Substituting TKR

This incorporates a central polyethylene eminence in the tibial insert to perform the function of an absent PCL. The corresponding femoral component uses A/P cuts and chamfers identical to those of the PCL-retaining component, allowing ready transition without revision of the prepared implantation site.

Revision TKR

The geometry of the tibial insert allows for substitution of the PCL and/or MCL in revision and complex primary situations. The selection of modular tibial and femoral stems and wedges will accommodate virtually any revision consideration. The system offers three levels of constraint to meet the varied requirements of revision cases; stabilised, constrained or TC3.

Pre-operative Planning

Full-length extremity roentgenograms are obtained and the mechanical and anatomic axes identified. Where the intramedullary alignment system is selected, the angle of the anatomic and mechanical axes indicates the appropriate angle to be used in conjunction with the intramedullary rod and the femoral locating device, thereby assuring that the distal femoral cut will be perpendicular to the mechanical axis. It is helpful to draw the femoral and tibial resection lines on the film as an intra-operative reference.

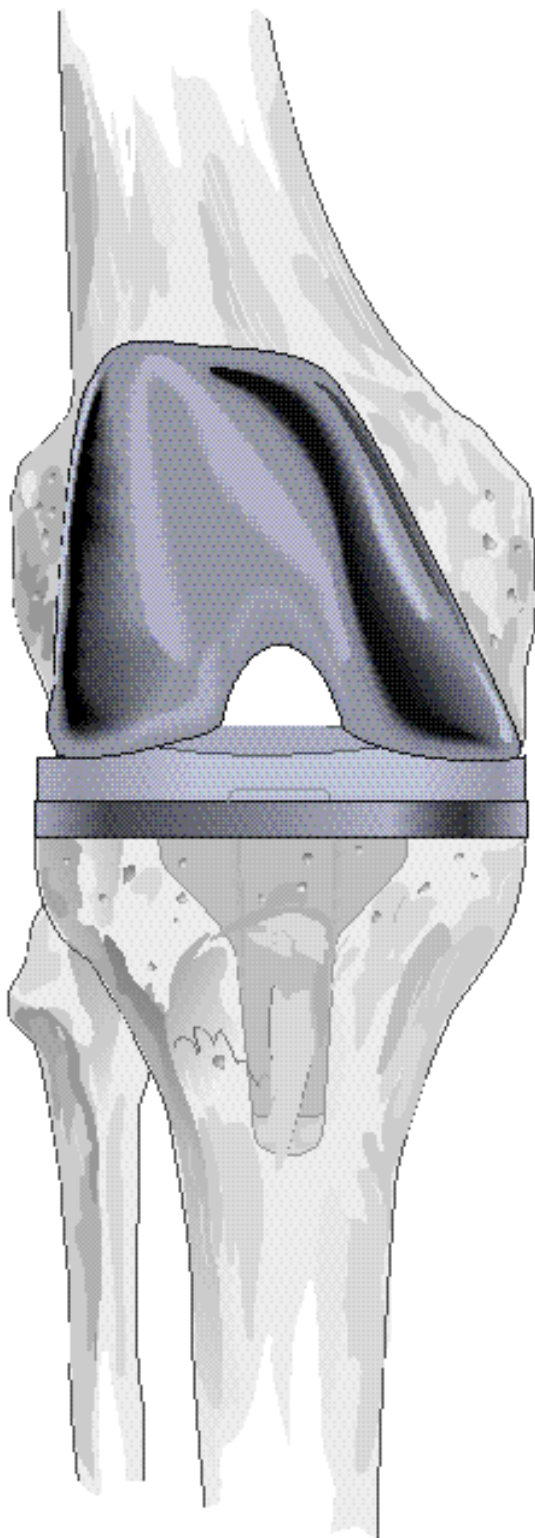
Radiographic templates are overlaid on the films to estimate the appropriate size of the prosthesis. The femoral component is sized on the lateral view. The A/P size is critical to the restoration of normal kinematics and quadriceps function.

Instrumentation Rationale

Specialist® 2 Instrumentation was designed to address the requirements of all total-knee replacement procedures, to fully assure precise and dependable resection of the recipient bone and to serve a variety of surgical options. The instruments can be customised to meet any special requirements of the individual surgeon.

Preparation may be initiated at either the femur or the tibia. The instruments may be employed with either the intra-or extramedullary alignment approach. Bone resection is made at the appropriate level as determined through a calibrated stylus assembly. A selection is offered of slotted and surface-cutting blocks. Spacer blocks are provided for extension and flexion gap evaluation. Patellar instrumentation is available for compatible preparation of either resurfaced or inset patellar implants.

Primary Cruciate-Retaining Procedure



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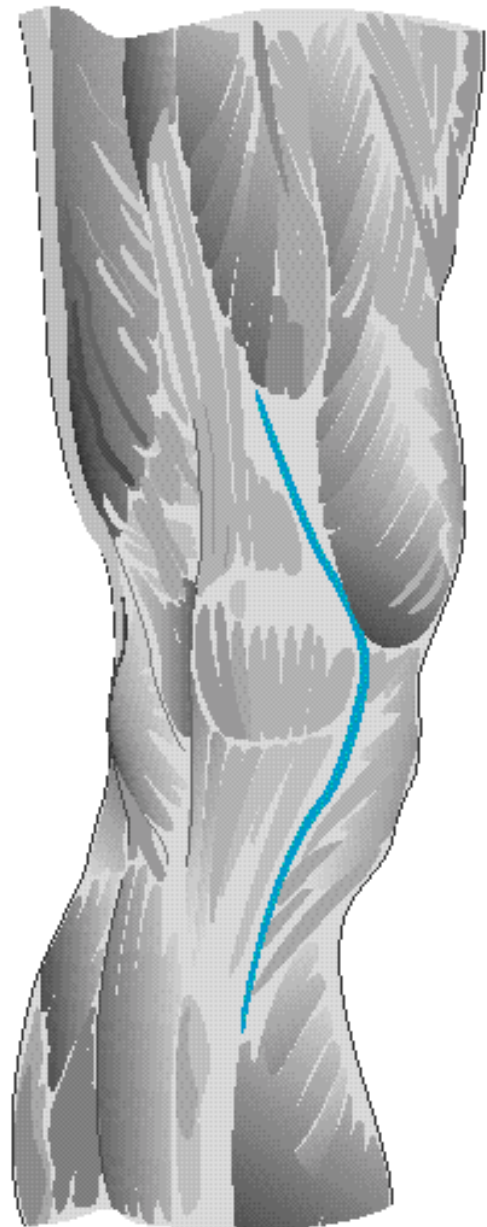
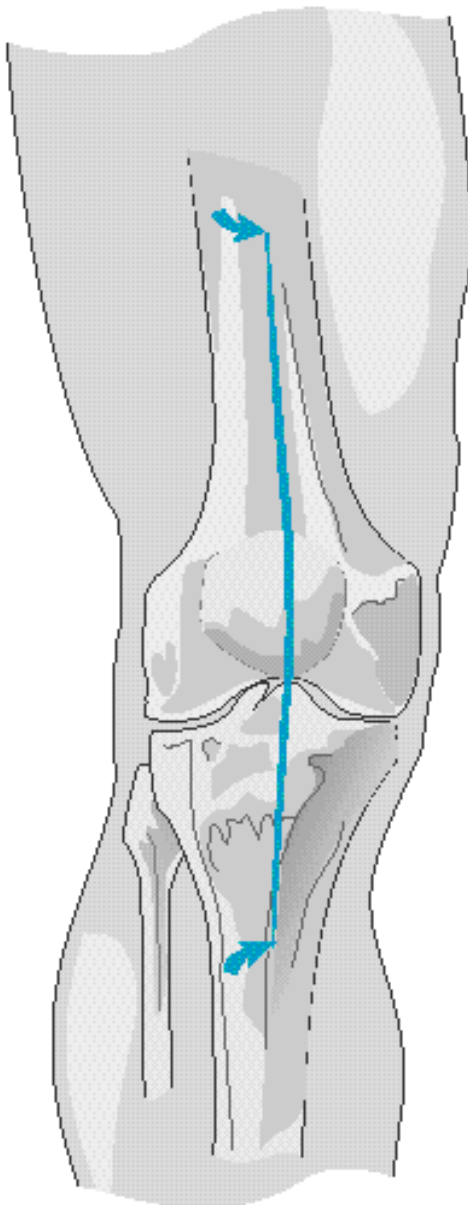
The Surgical Approach

The extremity is appropriately prepared and draped. A tourniquet is applied and following application of an Esmarch bandage, inflated.

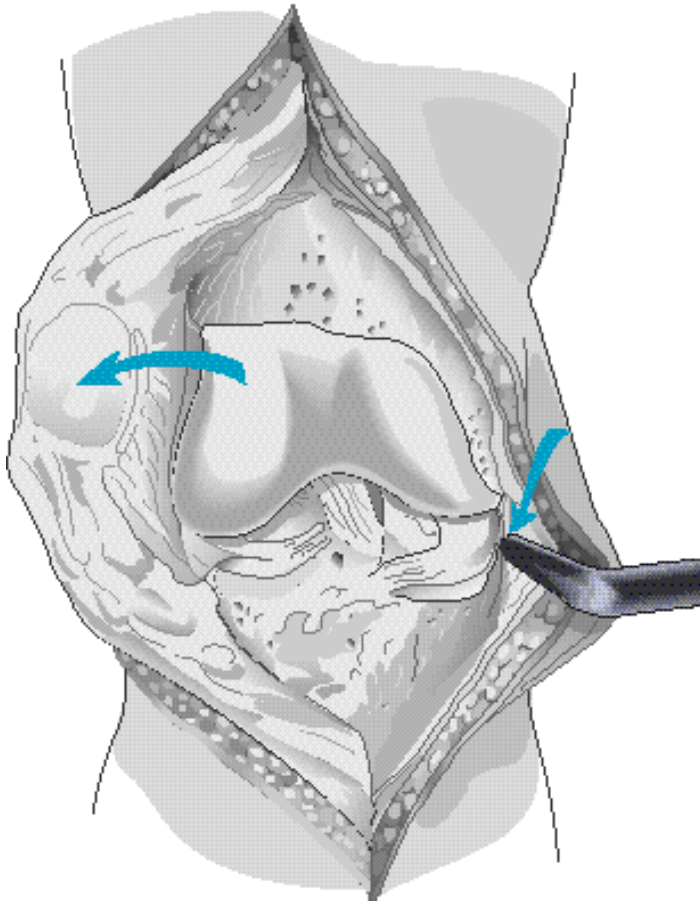
The skin incision is longitudinal and, where possible, straight. It is initiated proximally from the midshaft of the femur and carried over the medial third of the patella to the medial margin of the tibial tubercle.

The joint is entered through a medial parapatellar capsular approach, extended proximally to the inferior margin of the rectus femoris and distally to the medial margin of the tubercle.

Note: Where indicated, the subvastus or the lateral approach may be used.



Exposure

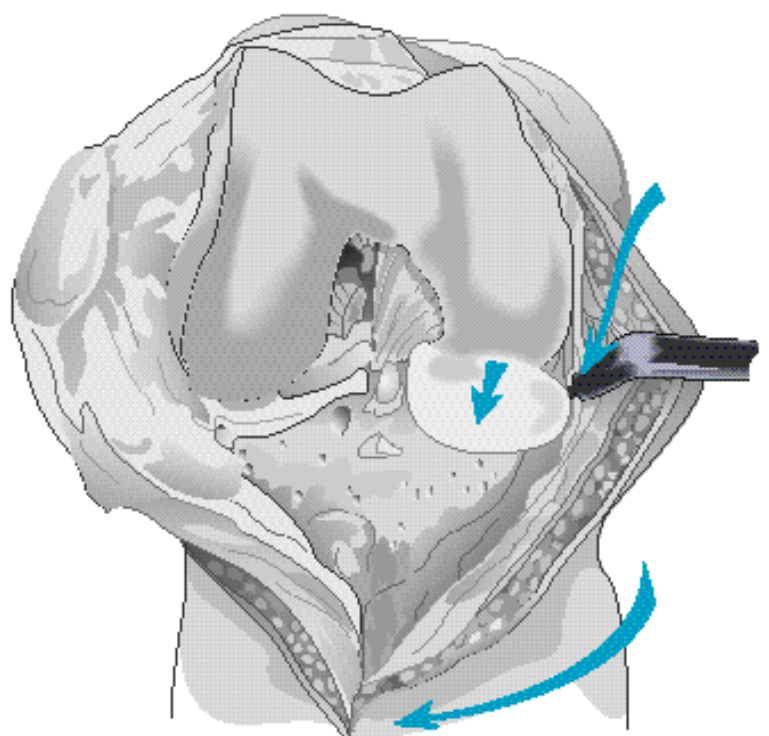


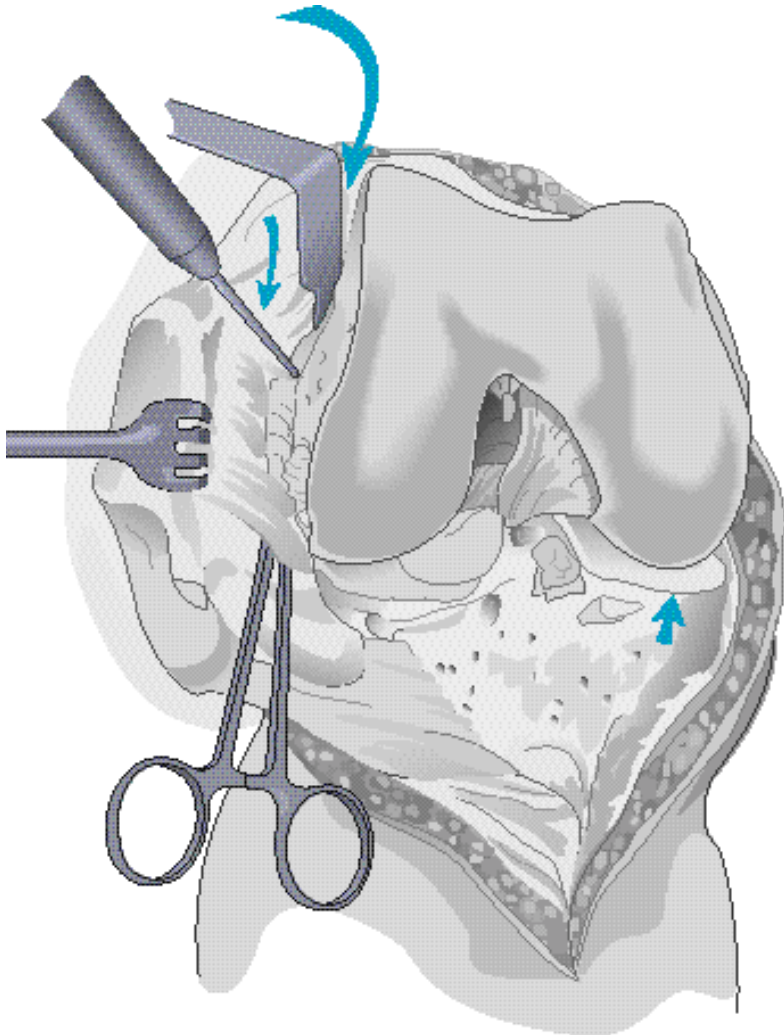
Exposure and preliminary balance must be based on the patient's pre-operative deformity and soft-tissue stability. The following is for mild varus deformity.

Note: See Appendix I for discussion of soft-tissue balance.

With the knee in extension, the patella is everted laterally. The medial tibial periosteum is elevated and a narrow 90° Hohmann retractor positioned subperiosteally around the medial border of the medial condyle. Residual periosteum is dissected posteromedially to the level of the insertion of the semimembranosus. The knee is flexed and a partial meniscectomy performed. Any residual ACL is excised.

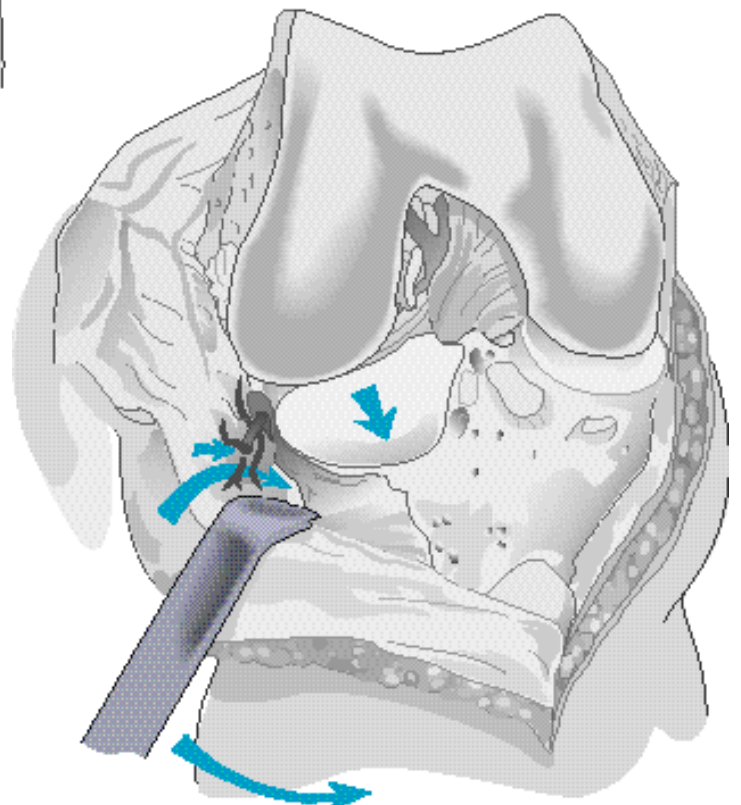
With the knee in 90° of flexion, the tibia is externally rotated with posteromedial dissection, bringing its medial condyle clear of the femur. Medial meniscectomy is completed, and attention directed to the lateral side.



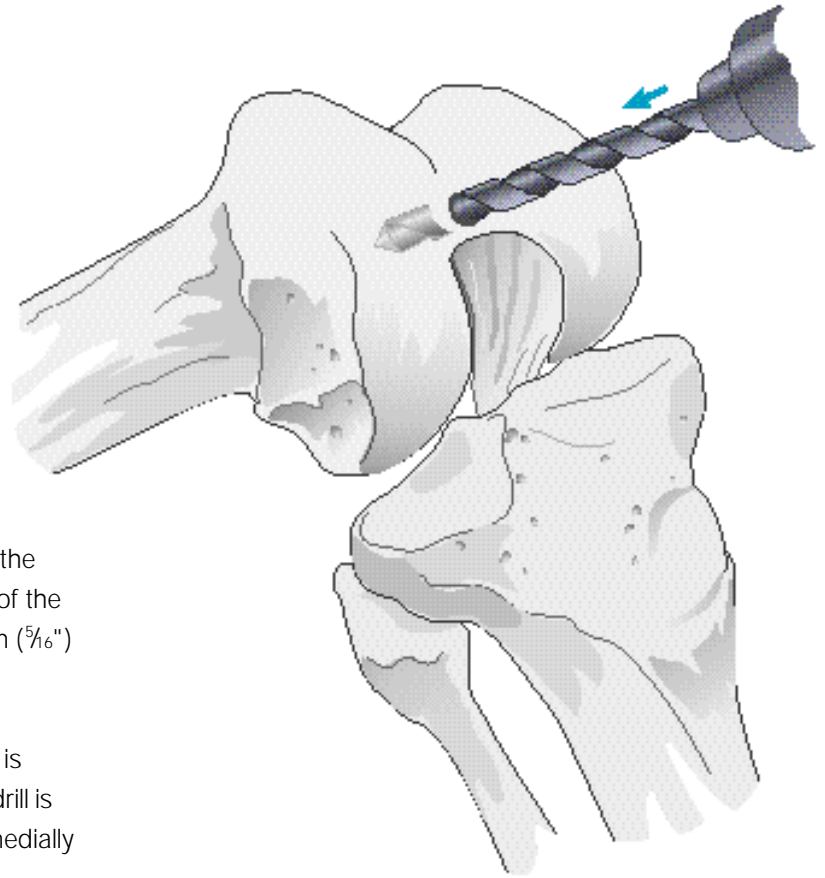


A 90° Hohmann retractor is positioned between the everted patella and the distolateral femur, exposing the lateral patellofemoral ligament, which is incised with electrocautery.

The retractor is repositioned at the interval of the iliotibial tract and the tibial attachment of the capsule. The capsule is dissected free from the infrapatellar fat pad and a lateral meniscectomy is performed. The lateral inferior genicular artery is coagulated. The insertion of the iliotibial tract is identified and the capsule dissected from the lateral tibial condyle. The retractor is repositioned against the lateral tibial condyle.

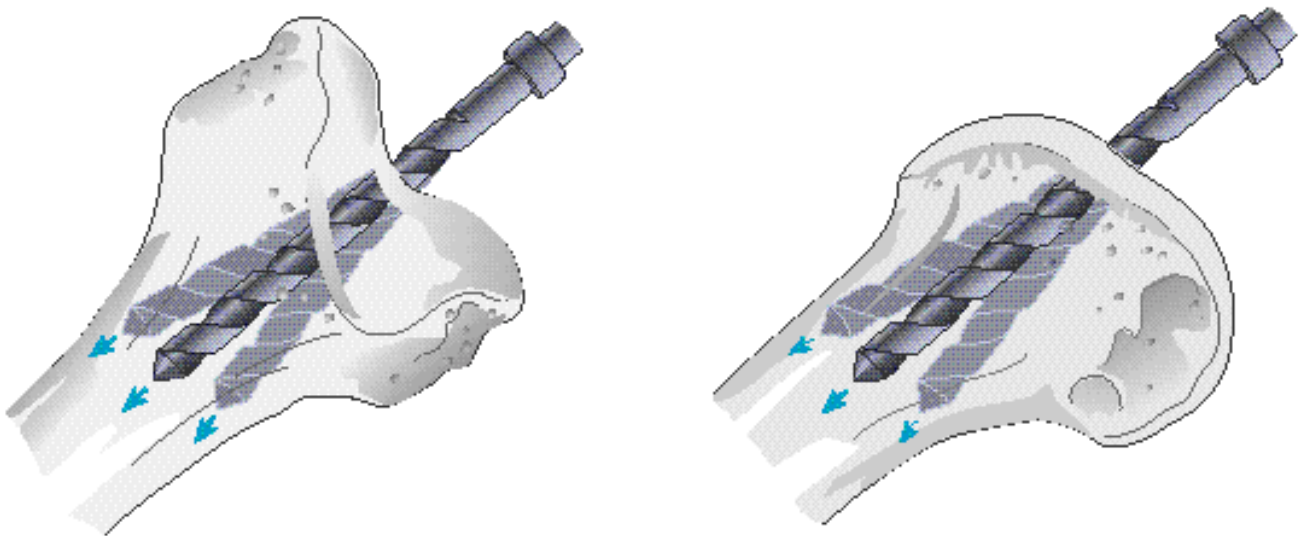


Entering the Medullary Canal



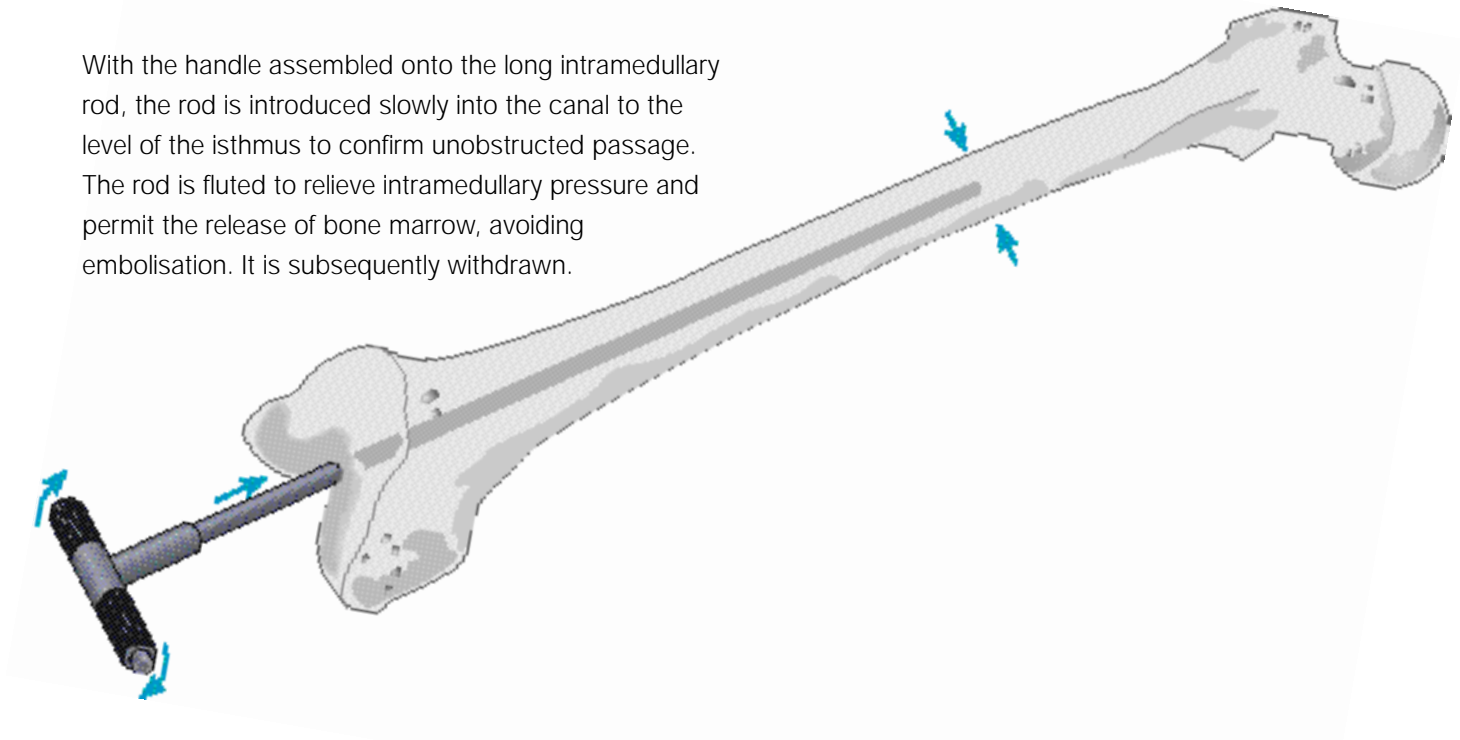
The medullary canal is entered at the midline of the femoral trochlea 7-10 mm anterior to the origin of the PCL to a depth of about 5-7 cm using a 7.9 mm ($\frac{5}{16}$ ") diameter drill.

Care is taken that the drill avoids the cortices. It is helpful to palpate the distal femoral shaft as the drill is advanced. The drill hole may be biased anteromedially to facilitate unobstructed passage of the long intramedullary rod to the diaphyseal isthmus, if indicated by pre-operative x-rays.



The Intramedullary Rod

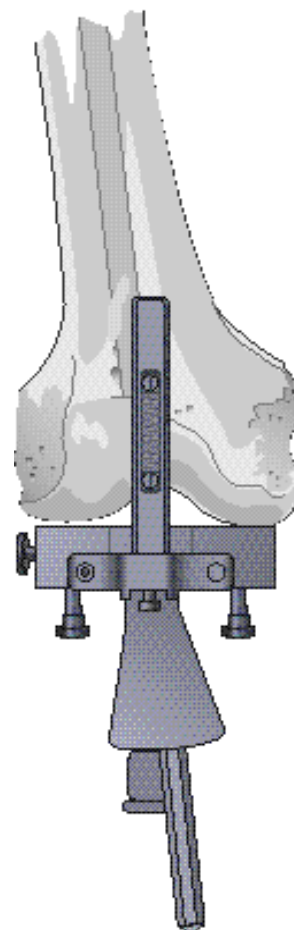
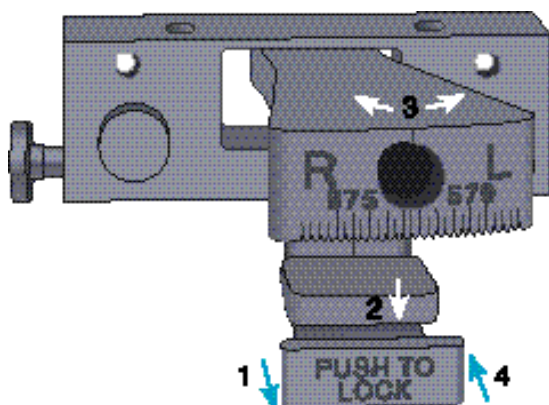
With the handle assembled onto the long intramedullary rod, the rod is introduced slowly into the canal to the level of the isthmus to confirm unobstructed passage. The rod is fluted to relieve intramedullary pressure and permit the release of bone marrow, avoiding embolisation. It is subsequently withdrawn.



The Femoral Locating Device

The valgus angle with the appropriate Right/Left designation, as indicated on the pre-operative films, is set and locked into place on the front of the locating device. The angle can be set from 0° to 9° in 1° increments.

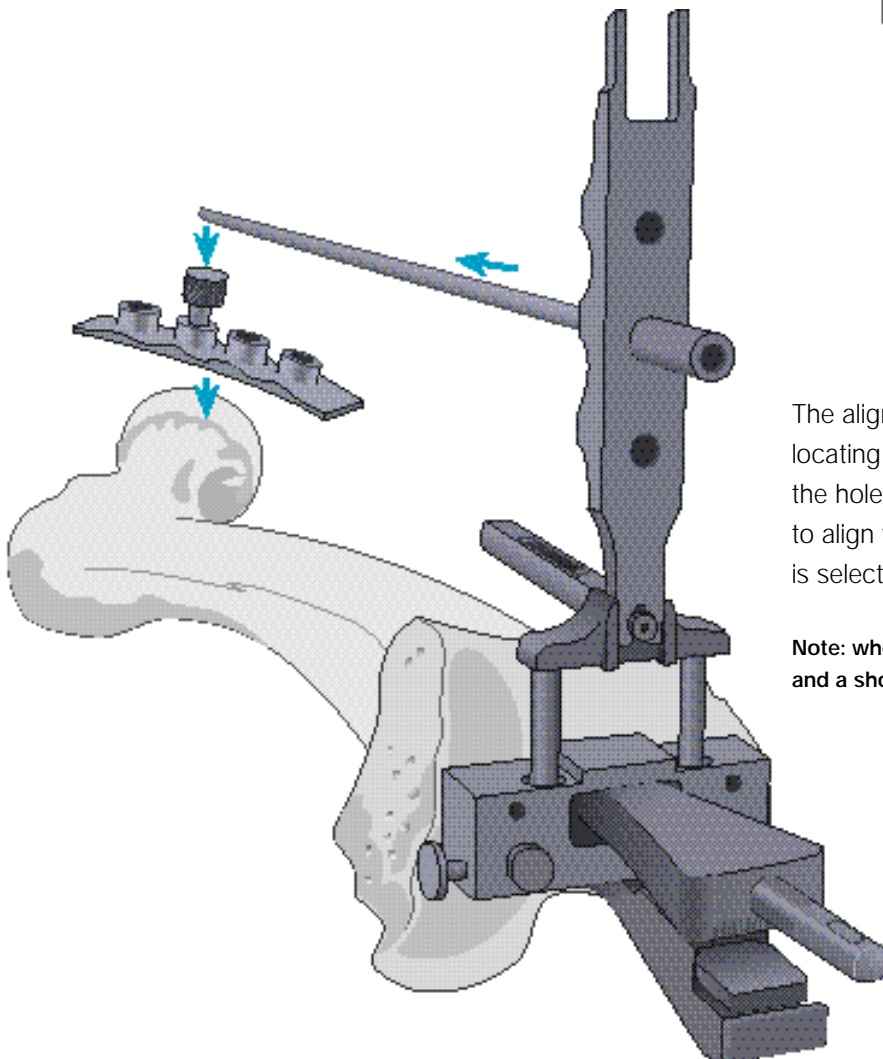
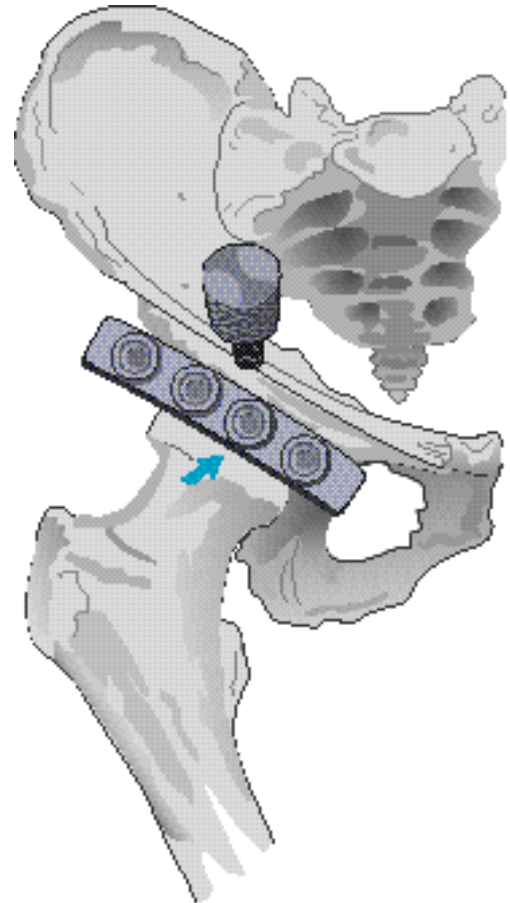
With the rod repositioned in the medullary canal, the handle is removed and the locating device is placed over the rod.



The External Alignment System

A radiopaque marker is positioned over the ipsilateral hip, parallel and immediately distal to the inguinal ligament. An A/P roentgenogram indicates which of four markers most closely approximates the rotational centre.

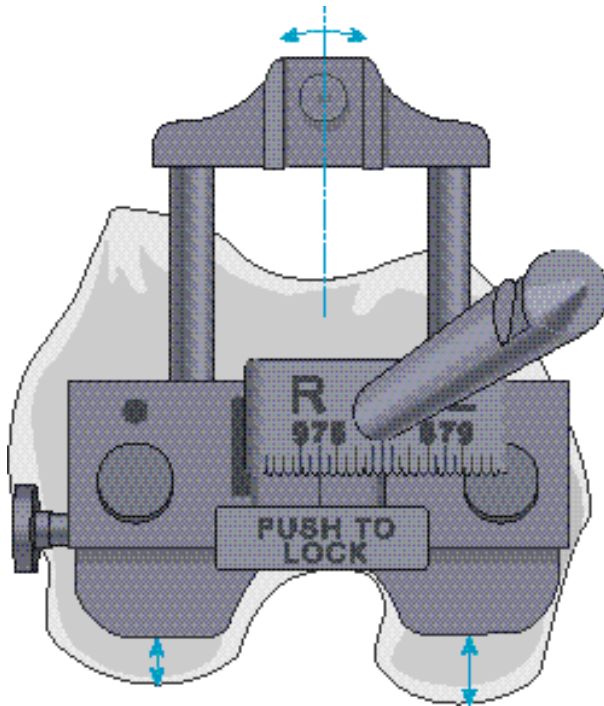
At surgery, the femoral-head locating strip is aligned with the markers. A target screw is introduced into the position overlaying the rotational centre. Draping is such that the screw is readily palpated at the coxal reference point.



The alignment tower is assembled onto the femoral locating device. The alignment rod is passed through the hole and advanced to the hip. Where the rod fails to align with the coxal reference point, a different angle is selected.

Note: where indicated, as in femoral deformity, 0° is selected and a short intramedullary rod is substituted. See Appendix II.

Rotational Correction

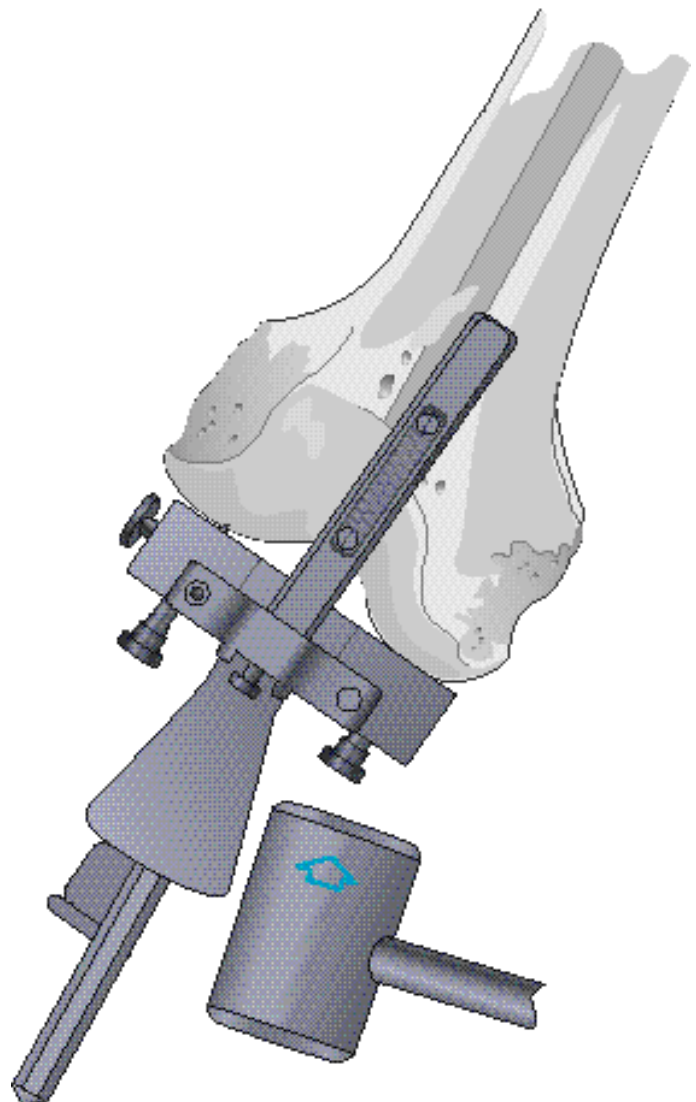


Orientation is initially determined with reference to the posterior femoral condyles, subject to subsequent correction at the A/P resection. The calibrated outrigger is centred at the femoral trochlea, placing it in slight external rotation and exposing a greater amount of medial condyle.

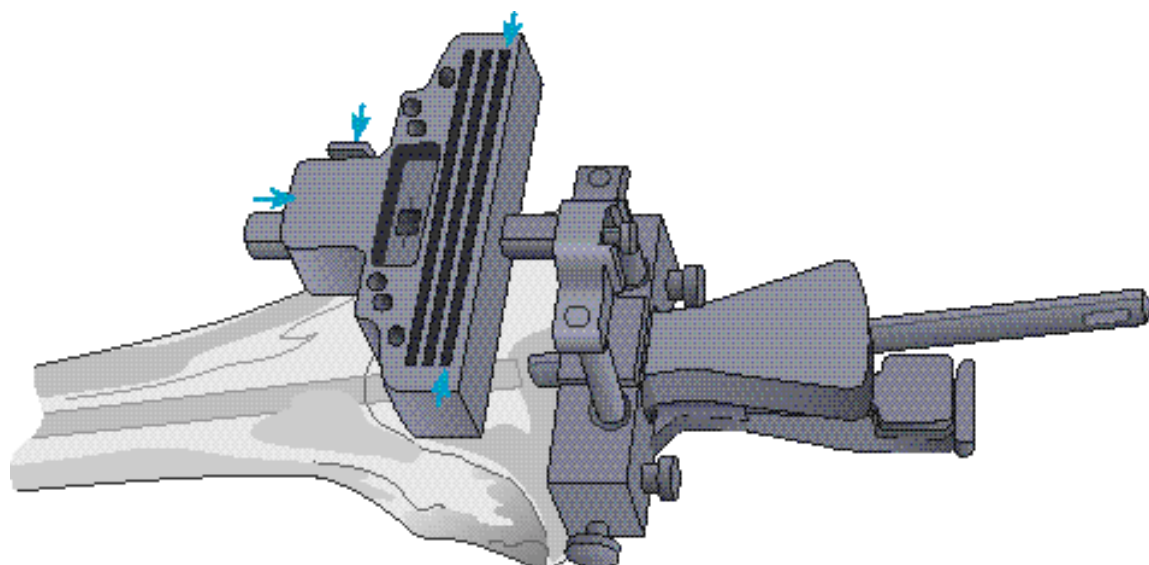
Alternatively, it may be externally rotated until perpendicular to the mechanical axis of the tibia in 90° of flexion.

The femoral locating device is tapped into position at the more prominent condyle (usually the medial).

Note: It is essential that firm contact be established at the subchondral level of the condyle, clear of any residual peripheral osteophytes.



The Distal Femoral Cutting Block

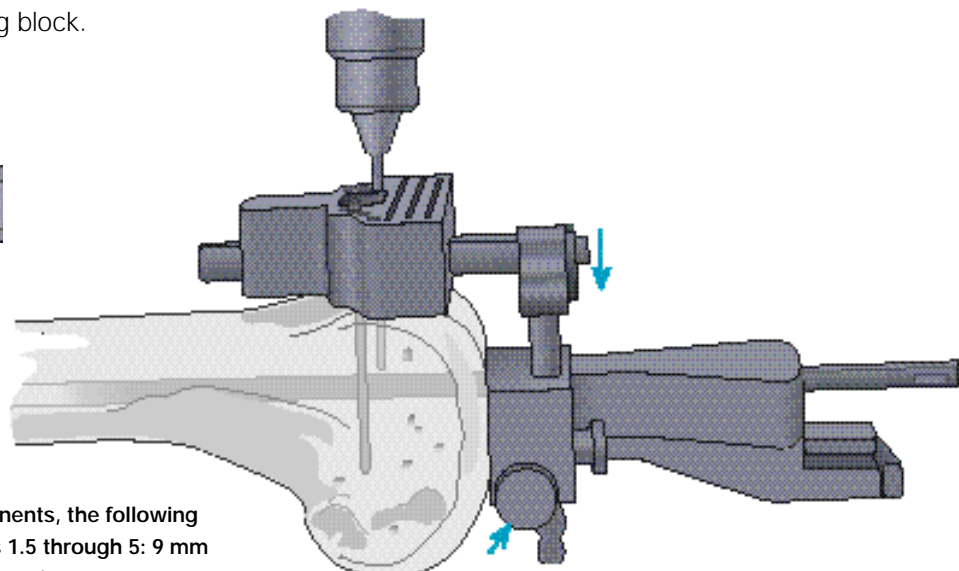


The cutting block is assembled onto the calibrated outrigger by depressing the button located on the right proximal end. The resection of the more prominent condyle, inclusive of residual cartilage, will correspond to the distal dimension of the femoral prosthesis. Where the femoral locating device rests on eburnated bone, resection is 2 mm less than the distal dimension of the femoral prosthesis to allow for absent cartilage and to avoid elevation of the joint line.

The scale for the numbers on the outrigger is even on the left and odd on the right. The number corresponding to the appropriate resection level is aligned with the inscribed line in the centre of the window of the distal femoral cutting block.

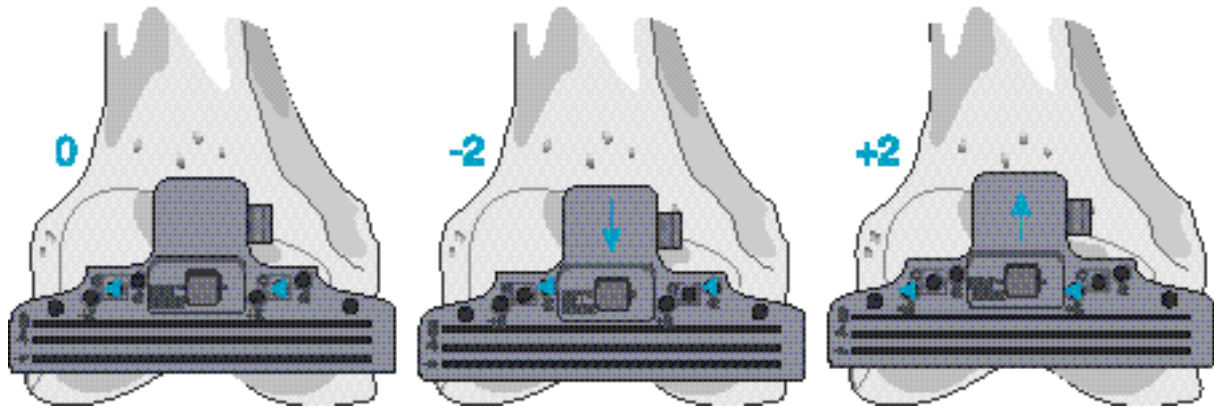
The base block is slotted; however, if used without the slot and the resection is initiated from the top of the block, 4 mm is added to the resection level. For example, if 9 mm is the desired resection level, add 4 mm to this and set the block at 13 mm and cut from the surface of the block. Note the top of the block is engraved "4 mm offset".

The outrigger and cutting block is lowered onto the anterior cortex by depressing the button on the left-hand side of the locating device. Either 3.2 mm ($\frac{1}{8}$ ") diameter drill bits or Steinmann pins are introduced through the holes designated zero and enclosed in □'s. They are advanced into the anterior cortex.



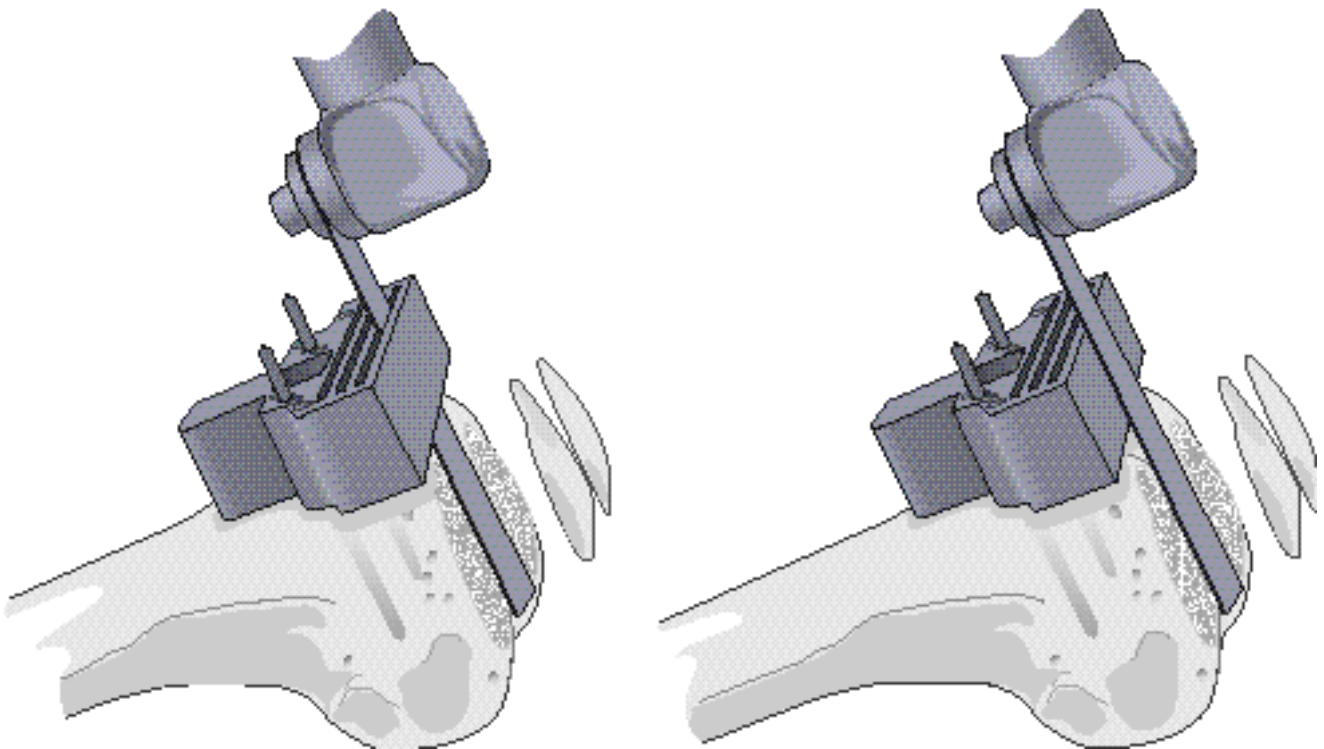
Note: For P.F.C.[®] Sigma Femoral components, the following distal resection is recommended: Sizes 1.5 through 5: 9 mm distal resection, size 6: 10 mm distal resection.

The Distal Femoral Cut

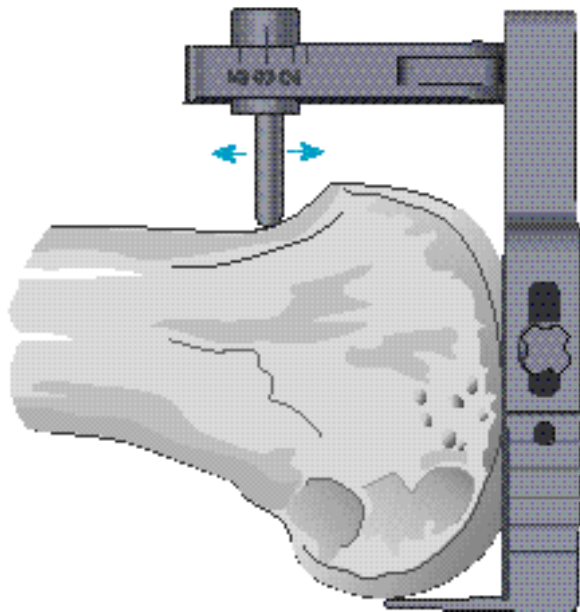


The locating device and intramedullary rod are disengaged from the cutting block by depressing the right button on the cutting block. The holes on the block are designated -2, 0, and +2 indicating in mm the amount of bone resection each will yield supplemental to that indicated on the calibrated outrigger.

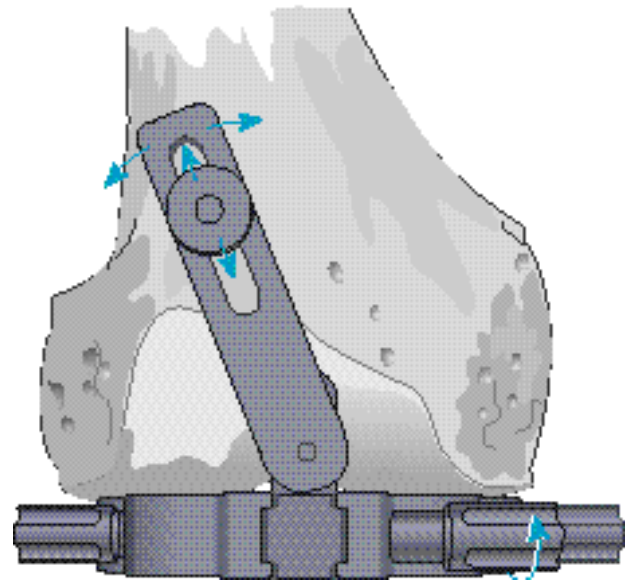
The oscillating saw blade is positioned through the slot, or, where applicable, the blade is positioned flush to the top cutting surface of the block. The condyles are resected and the surface checked for accuracy.



The Femoral Sizing Guide



The guide is seated flush and centred on the prepared distal femoral surface. The stylus is allowed to move freely within the guide and moved proximal to the articular surface.



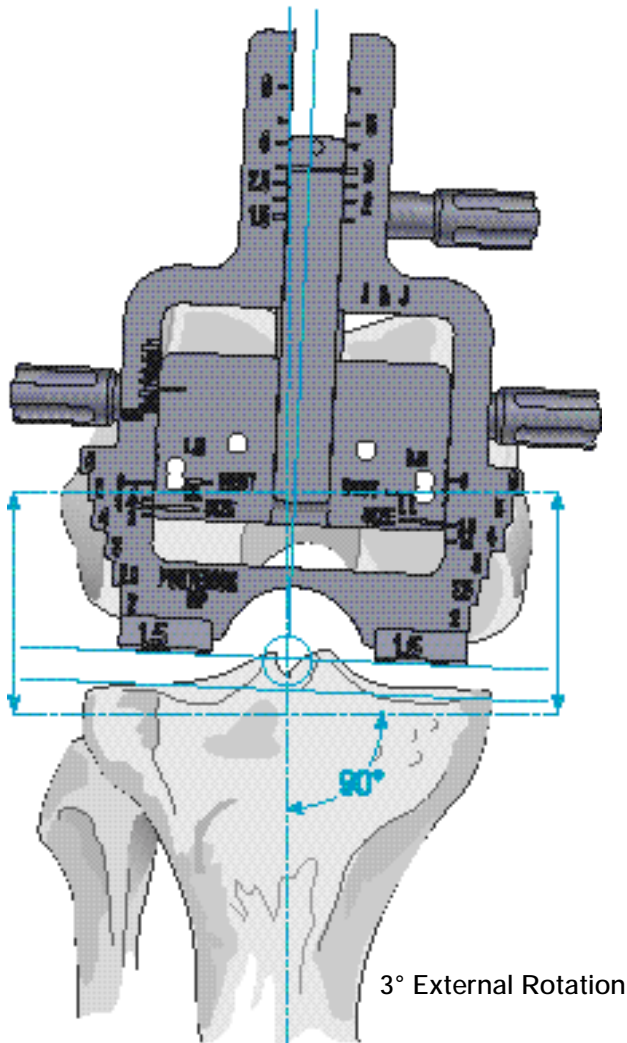
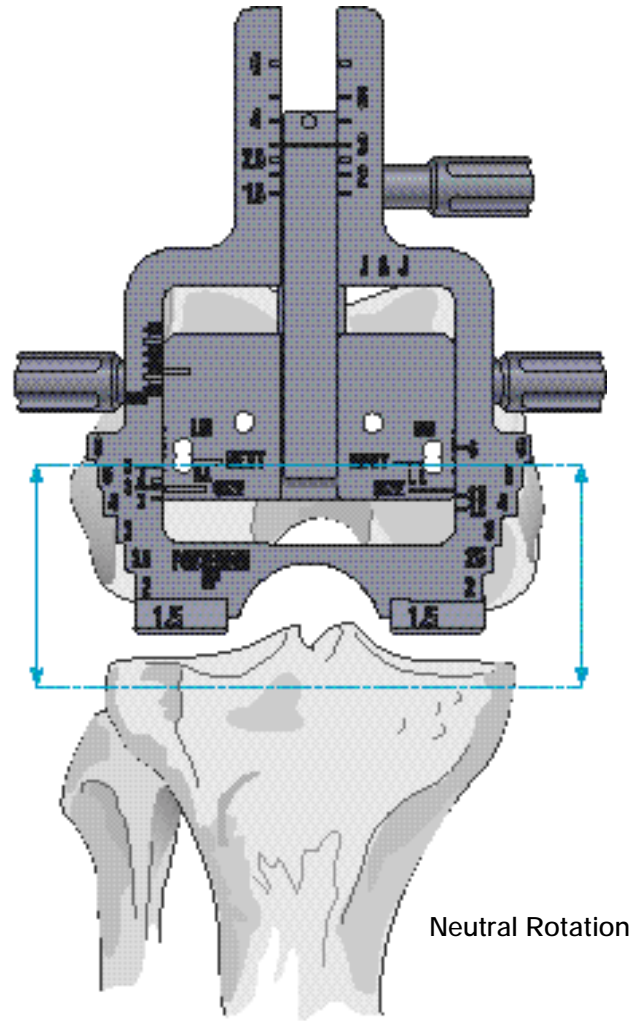
The stylus is passed over the anterior cortex immediately proximal to the articular surface. At the appropriate level where the stylus is not impeded, turn the stylus locking knob clockwise until tight, to fix its position.

Rotational Alignment

The sizing guide skirts are positioned against the posterior condyles. This determines rotational alignment. Where either condyle is deficient, the guide is rotated such that it lies perpendicular to the mechanical axis of the tibia.

Note: Alternatively, the tibia may be prepared first, wherein the A/P femoral cuts are based on the relationship of the condyles to the prepared tibial surface.

Where the appropriate position of the stylus is determined, secure the stylus arm in position by tightening the arm clockwise. The actual size of the femur is indicated on the vertical shaft of the stylus arm.



Where, as in most cases, the tibia is resected at 90° to its mechanical axis, the femoral component is positioned in approximately 3° of external rotation to produce flexion gap symmetry. Accordingly, the lateral posterior and medial anterior holes are selected, yielding 8 mm lateral and 10-11 mm medial resection. The cutting block thus positioned will yield a cut in 3° of external rotation, enhancing patellar tracking and promoting flexion gap symmetry. It will reduce soft-tissue release for tight medial flexion gap and allow commensurate rotation of the tibial component.

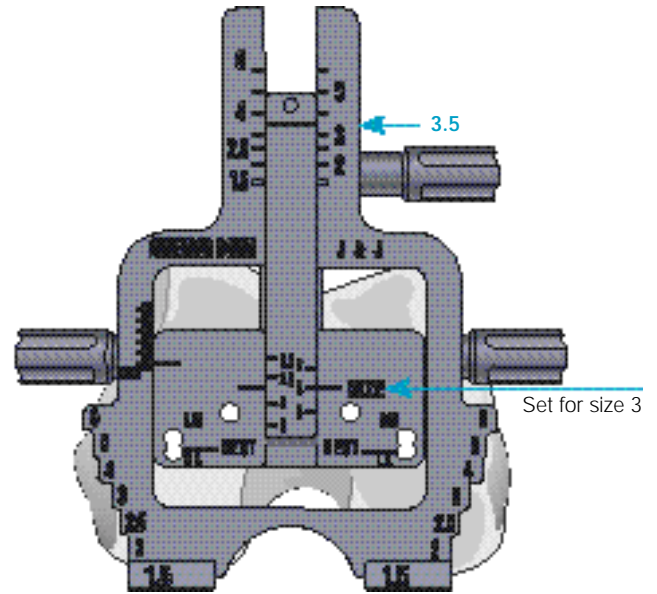
Occasionally, more than 3° of external rotation is indicated for flexion gap symmetry. Following removal of peripheral osteophytes, with 90° of flexion and the collateral ligaments tensed with laminar spreaders, the external tibial alignment device is positioned with its upper platform raised to the level of the holes made through the drill guide, which should lie parallel to the platform. Where more external rotation is indicated, the medial hole is repositioned anteriorly. In valgus deformity with lateral condylar hypoplasia, the lateral hole is repositioned posteriorly.

Femoral Sizing

The femoral sizing guide is available in two formats: Anterior Reference and Posterior Reference.

Anterior Reference Guide

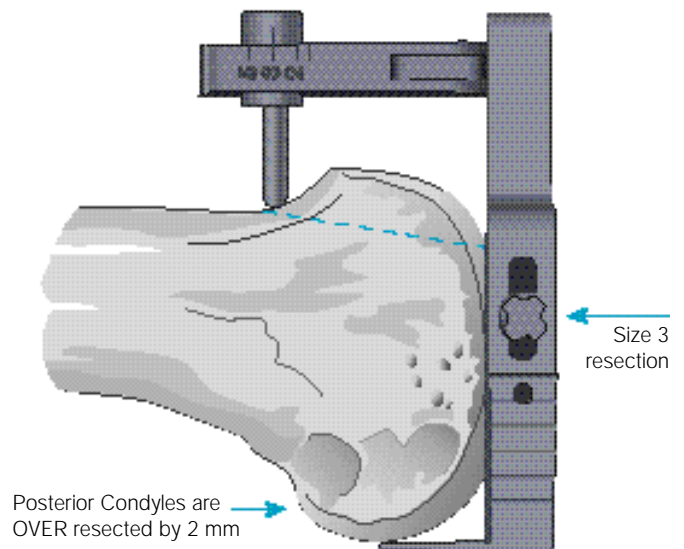
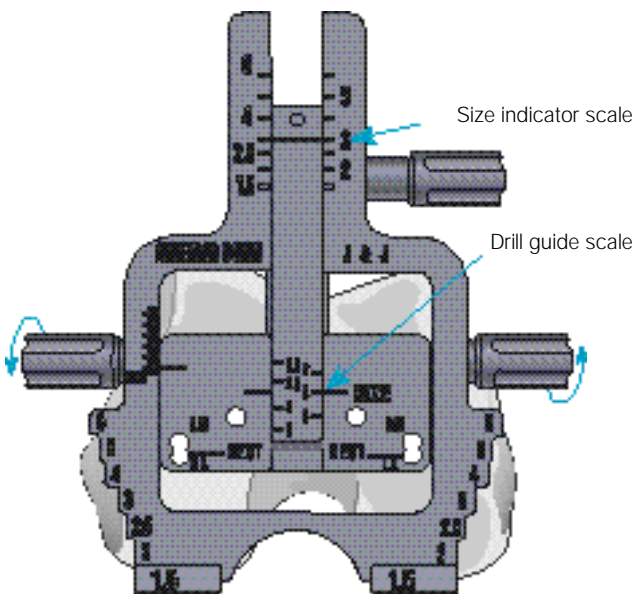
The sizing guide will position the femoral A/P chamfer cutting block such that the anterior flange of the prosthesis will generally fit flush with the anterior cortex of the femur. When the sizing device indicates a whole size, 8 mm will be resected from the posterior condyles, corresponding to the posterior condyle thickness of the prosthesis. The serrated edges of the drill guide show the M/L dimensions of the femoral component.



Where the femur measures between sizes, a decision needs to be made whether to “up-size” or “down-size” the femoral component.

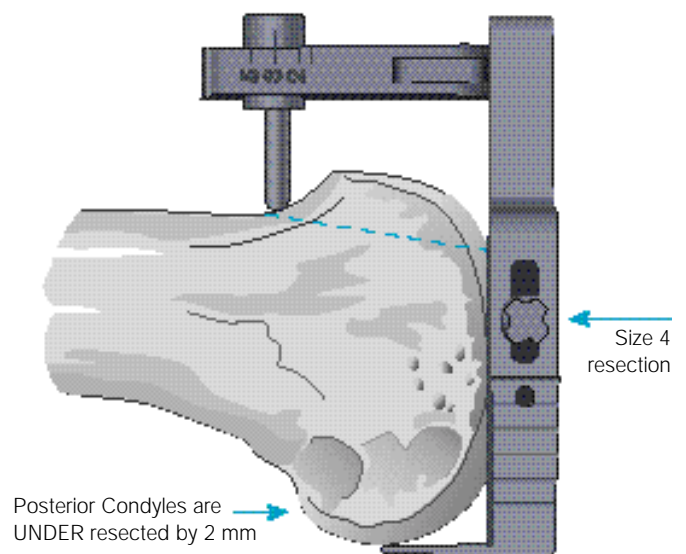
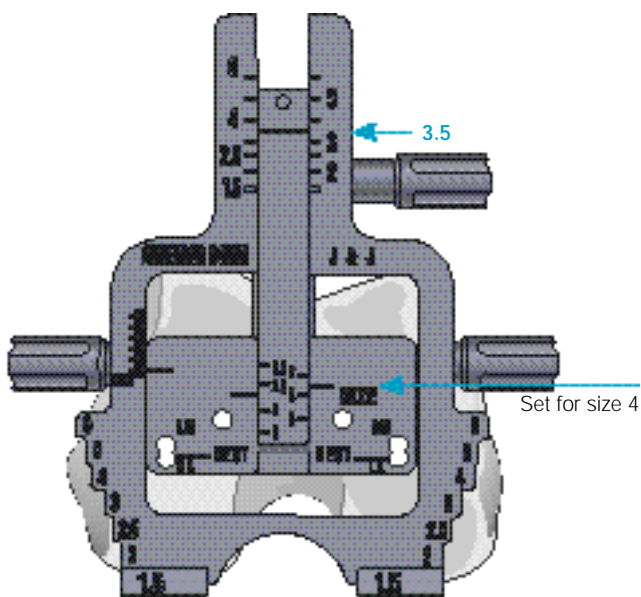
For whole sizes the guide will normally resect 8 mm from the posterior condyles, however when the femur measures between sizes, this amount of resection will vary depending on whether the femur is up-sized or down-sized.

For example if the size scale reads 3.5, and the decision is made to down-size, the drill guide is set to size 3, and a size 3 A/P cutting block is used. The guide uses the anterior cortex as a datum, the anterior cut remains constant and more bone will be resected from the posterior condyles.



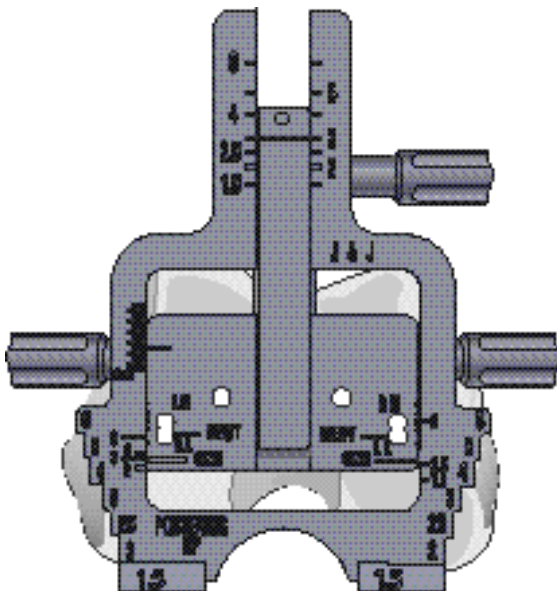
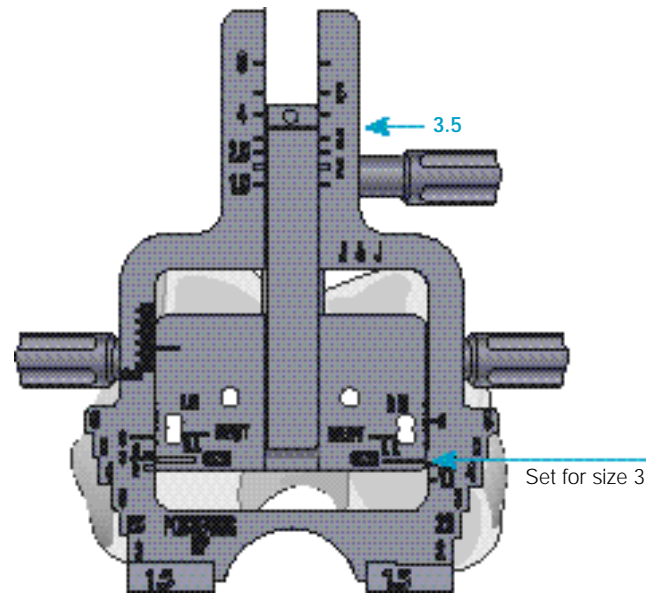
If the decision is made to up-size, the drill guide needs to be set to size 4 in this example, and a size 4 A/P cutting block used. The anterior cut will remain constant, but less bone is removed from the posterior condyles.

In both cases the under or over resection of the posterior condyles will affect the flexion gap, and therefore care must be taken to ensure that the flexion/extension gap is correctly balanced.



Posterior Reference Guide

The posterior reference sizing guide measures the femur in the same way as the anterior reference guide, the sizing guide will position the femoral A/P chamfer cutting block such that 8 mm will be resected from the posterior condyles, corresponding to the posterior condyle thickness of the prosthesis. However in this case referencing takes place from the posterior condyles as opposed to the anterior cortex.

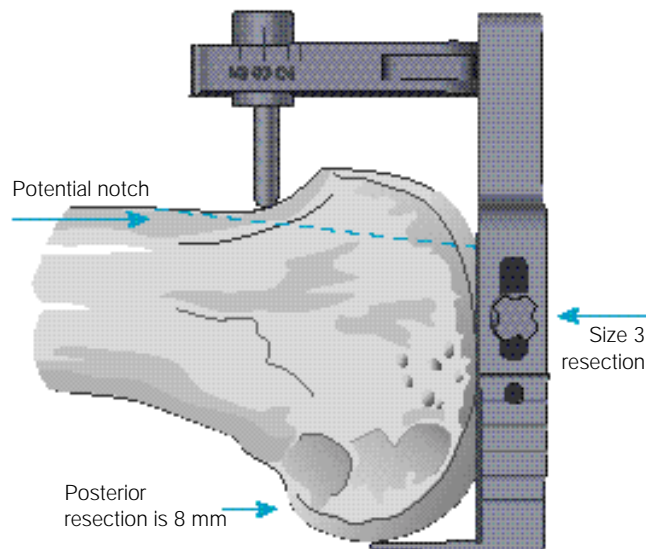


Where the femur measures between sizes, for example 3.5, there are three possible options:

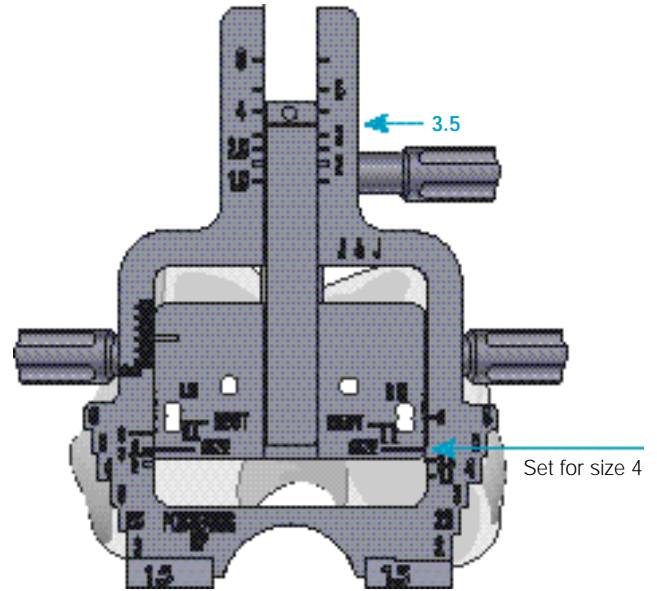
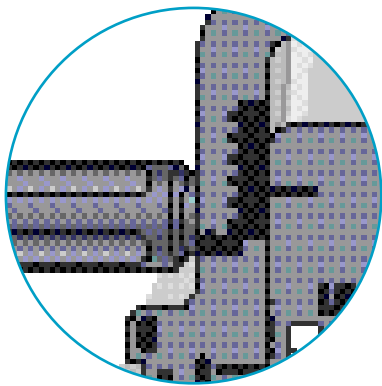
1. Down-sizing, set the drill guide to size 3 and use a size 3 cutting block.

This will give an 8 mm posterior resection

As this option increases the amount of anterior resection, care should be taken to avoid notching the anterior femoral cortex. This check can be made using the reference guide (966530) in conjunction with the A/P cutting guide.

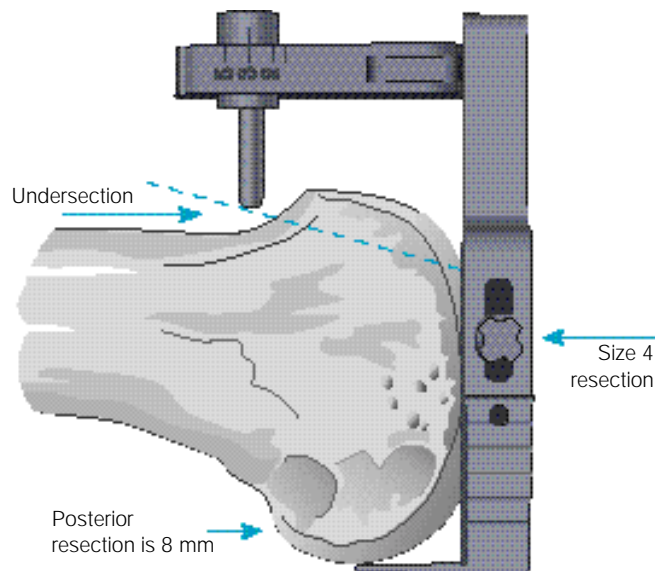
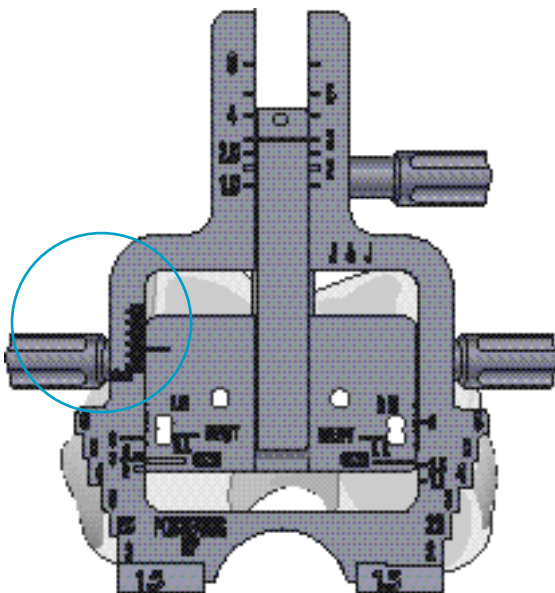


The millimetre scale on the side of the drill guide can be used to 'ease' the anterior cut by moving the drill guide anteriorly. This will increase the posterior cut and thereby the flexion gap size. Care should be taken to keep a balance between the anterior cut and the flexion space.



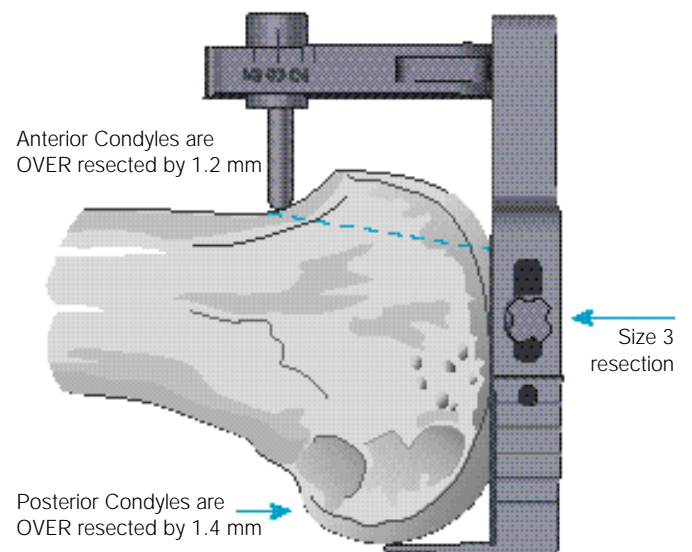
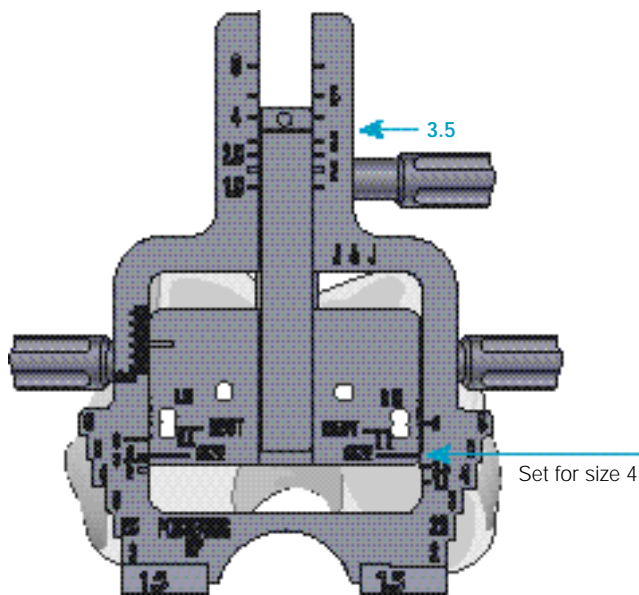
- Up-sizing, set the drill guide size to size 4 and use a size 4 cutting block. This again will resect 8 mm from the posterior condyles but less anteriorly.

As this option decreases the amount of anterior resection, care should be taken to avoid tightness in patellar/femoral tracking which may occur with under-resection of the anterior surface of the femur.



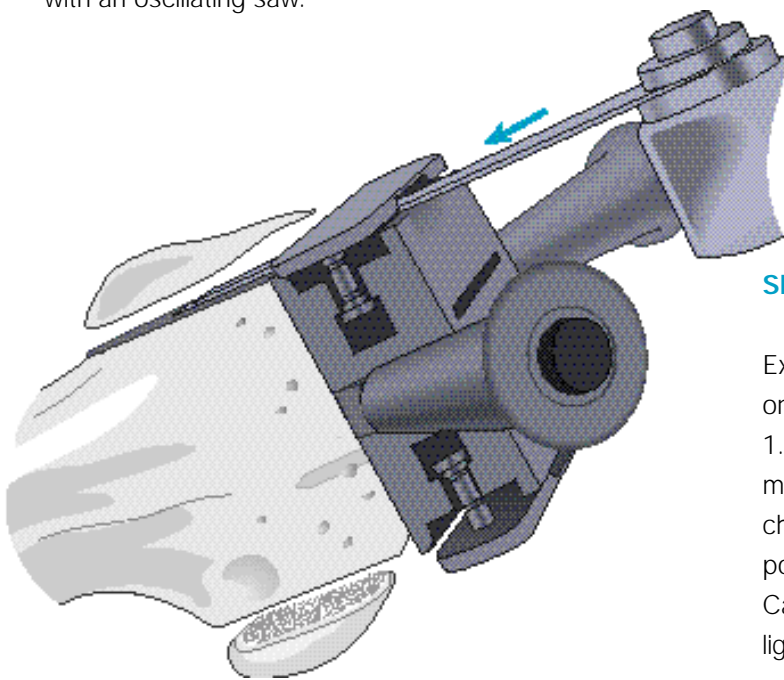
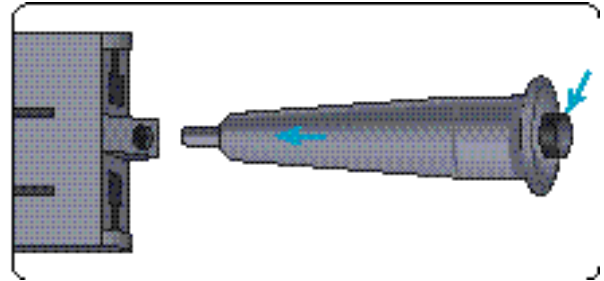
- The third option is to divide the extra bone resection involved in down sizing between the anterior and posterior cuts.

This can be achieved by setting the drill guide to 4 and using the size 3 cutting block. This will increase the posterior resection by 1.4 mm and the anterior by 1.2 mm.



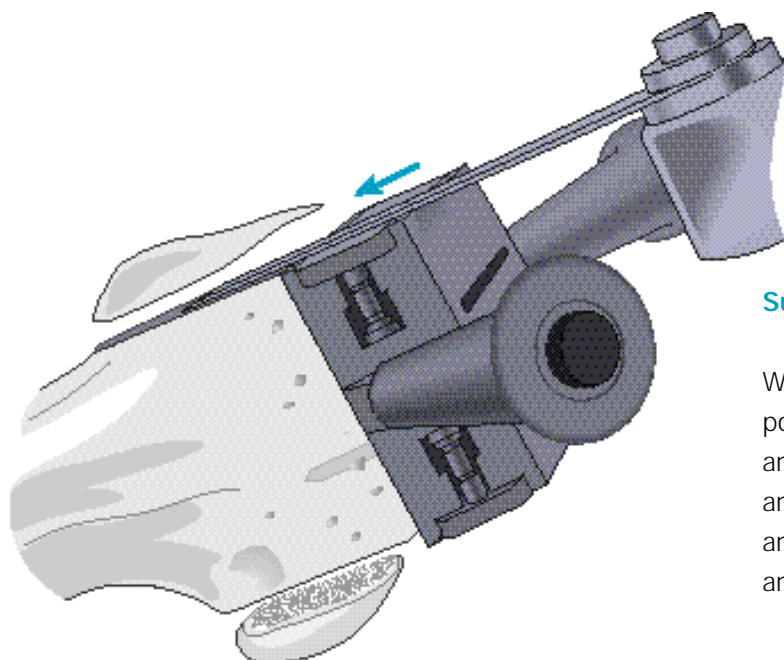
Anterior, Posterior and Chamfer Cuts

The drill guide is removed and the corresponding A/P chamfer cutting block selected. Assemble the removable handles by depressing the button and inserting the handle into the receptacle and turning until locked into position. The A/P chamfer cutting block is seated into the drill holes and flush to the prepared surface. The anterior, posterior and chamfer cuts are performed with an oscillating saw.



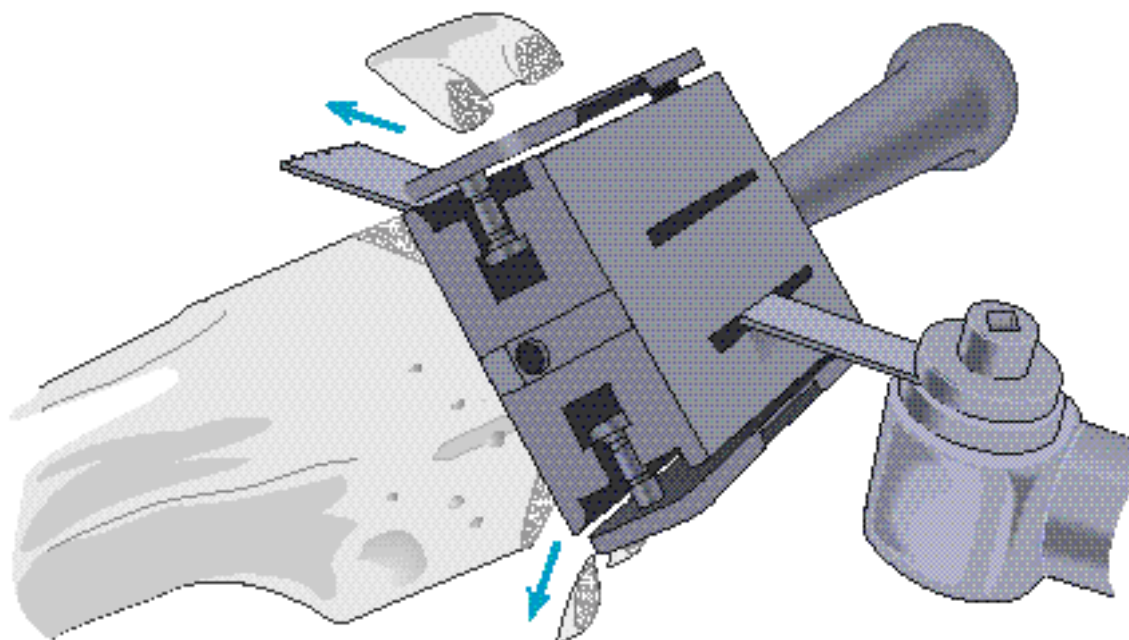
Slotted A/P Chamfer Cutting Blocks

Extend the anterior and posterior plates to create slots on the block. Insert the blade of the oscillating saw (a 1.19 mm saw blade is recommended) to the femur and make the anterior and posterior cuts. The anterior chamfer cut is made through the posterior slot and the posterior chamfer cut is made through the anterior slot. Care is taken that the posterior cruciate and collateral ligaments are protected.

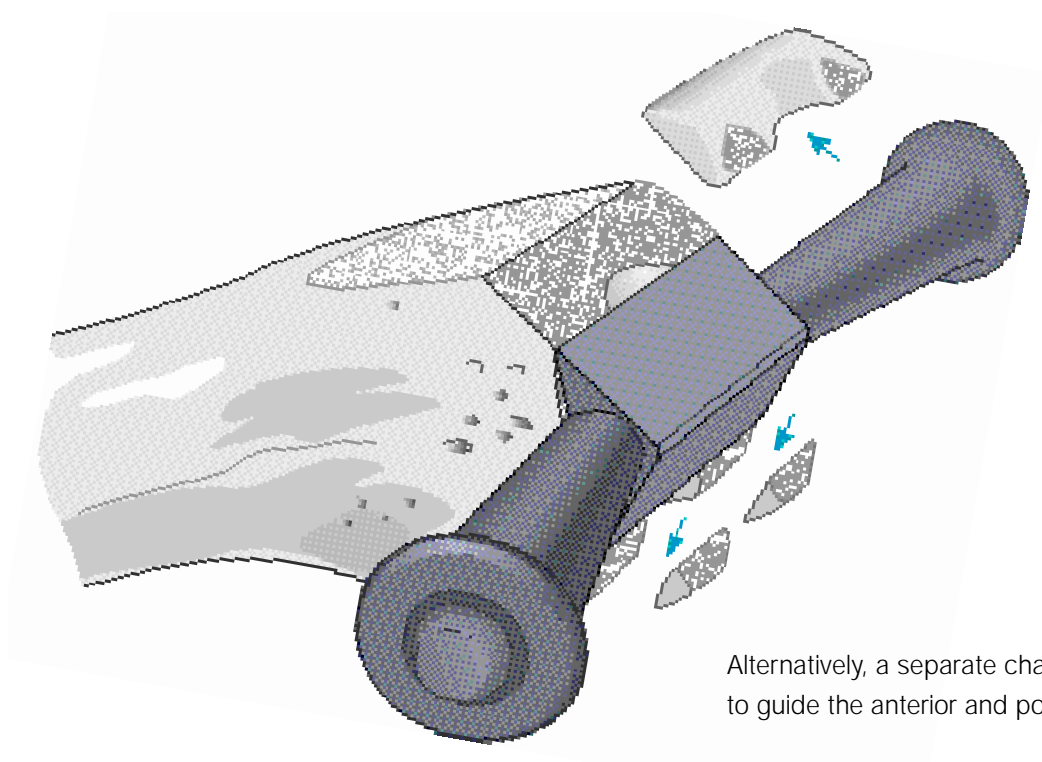


Surface A/P Chamfer Cutting Blocks

With the anterior and posterior plates in their retracted position, make the anterior and posterior cuts. The anterior chamfer cut is made through the posterior slot and the posterior chamfer cut is made through the anterior slot. Care is taken that the posterior cruciate and collateral ligaments are protected.



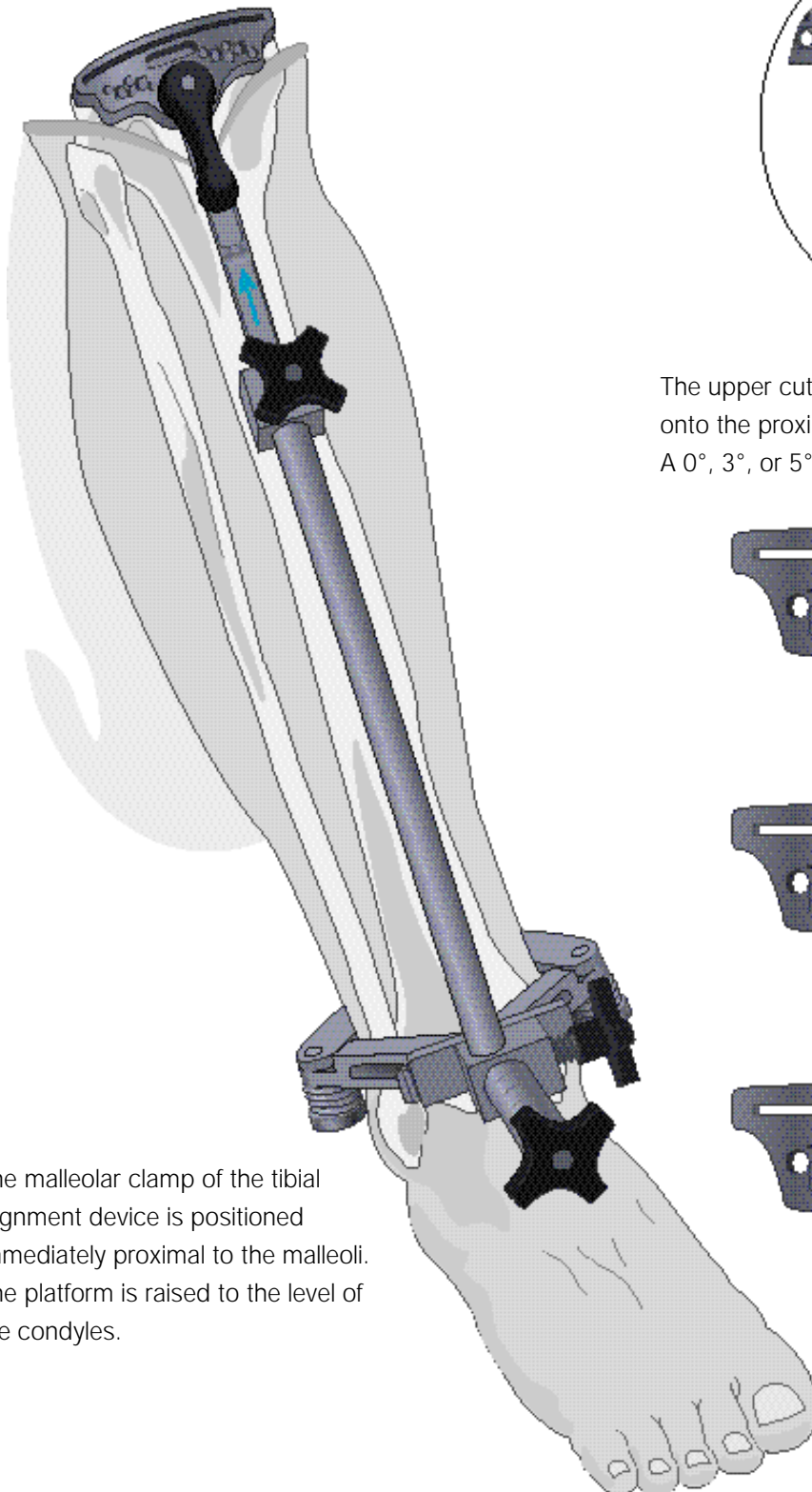
The chamfers are made through the slotted A/P block.



Alternatively, a separate chamfer block can be used to guide the anterior and posterior chamfer resections.

Tibial Alignment

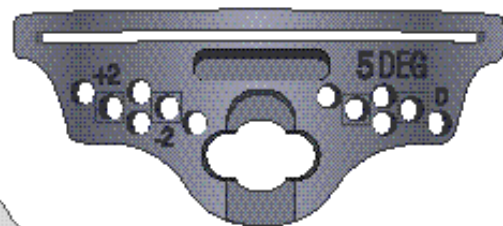
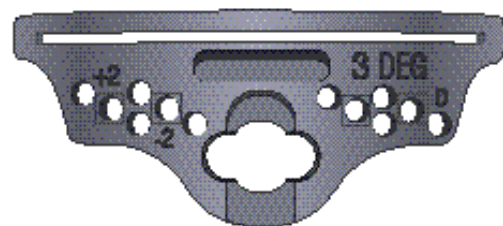
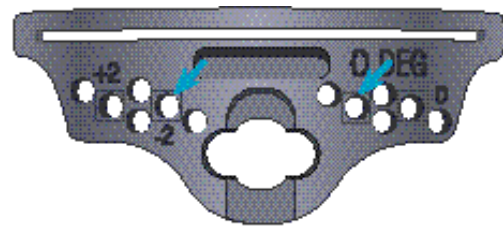
The knee is placed in maximal flexion with the tibia distracted anteriorly and stabilised.



The malleolar clamp of the tibial alignment device is positioned immediately proximal to the malleoli. The platform is raised to the level of the condyles.

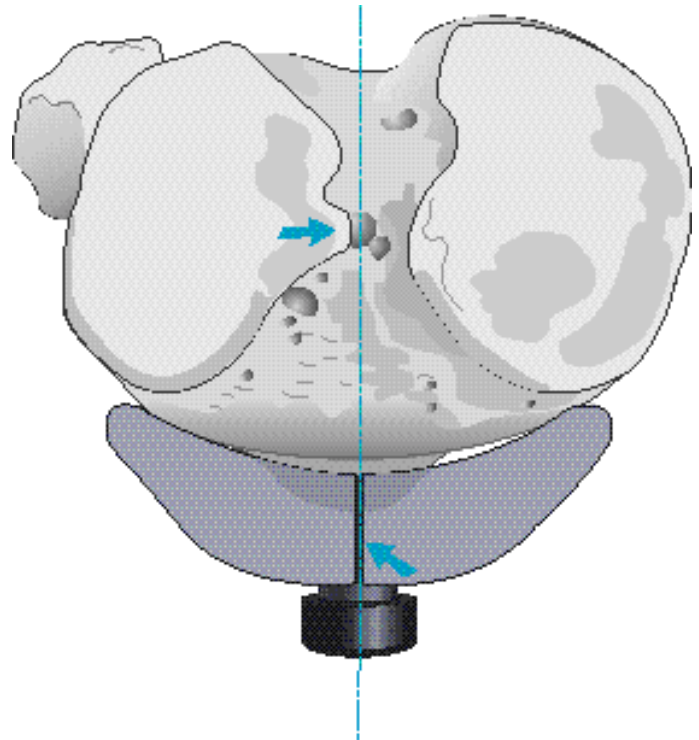


The upper cutting platform is assembled and secured onto the proximal uprod of the tibial alignment device. A 0°, 3°, or 5° cutting block can be chosen.

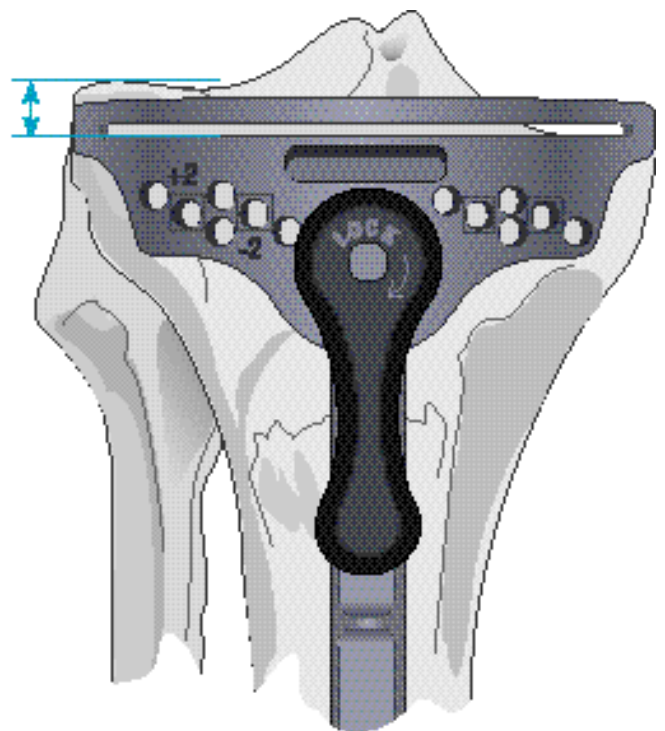


The Upper Platform

The upper platform is aligned with the medial third of the tibial tubercle and medial margin of the lateral intercondylar eminence with the extremities of the cutting surface against the anterior cortex.

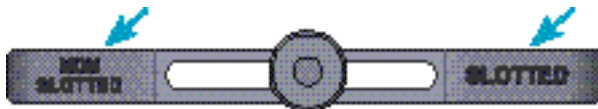


The exact level of resection will vary according to patient anatomy. As the mediolateral transverse plane of the tibial plateau is usually 3° from the perpendicular and the projected cut is perpendicular to the anatomic axis, more bone is typically removed from the lateral condyle.



The Tibial Stylus

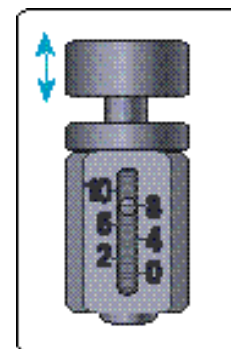
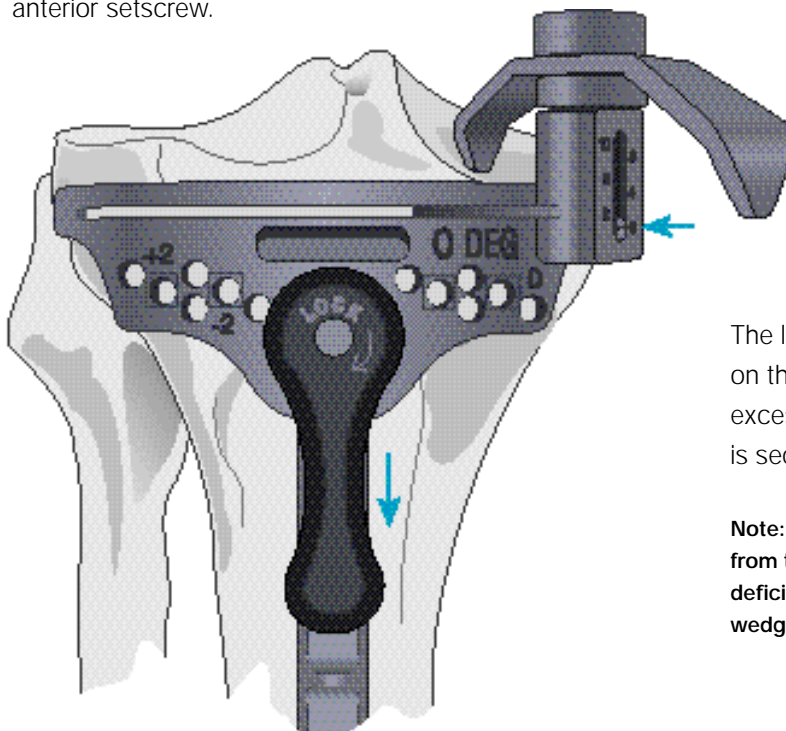
The stylus determines the exact level of resection.



The outrigger of the stylus is marked non-slotted and slotted at either end. When the tibial resection is performed from the surface of the block, choose the non-slotted end of the outrigger; conversely, when the resection is performed through the slots, choose the slotted end of the outrigger. There is a 4 mm difference between the top surface and the slot.

The cylinder foot is inserted into the slot of the cutting block and adjusted to the appropriate level. It is calibrated in 2 mm increments, indicating the amount of bone and residual cartilage to be resected.

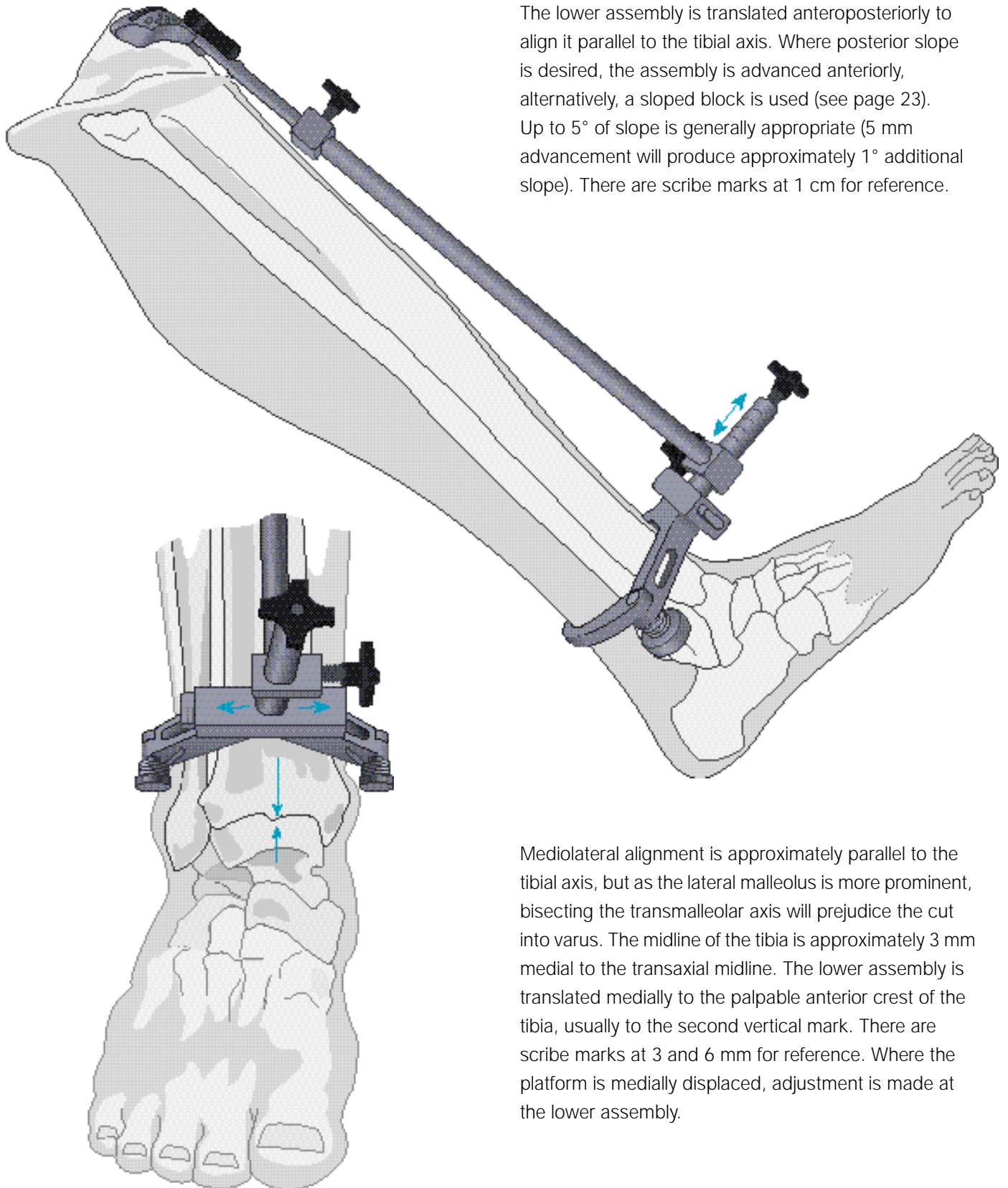
A level of 8 mm or 10 mm is suggested where resection is based on the less involved condyle. The block is adjusted such that the stylus rests on the centre of the condyle and the cutting block is secured by the large anterior setscrew.



The level of 0 is selected where resection is based on the more involved condyle and does not result in excessive contralateral resection. The cutting block is secured by the large anterior setscrew.

Note: Where this indicates greater than 10 mm of resection from the contralateral condyle, a higher level is indicated. The deficiency is augmented with cement, bone graft or a modular wedge, as the situation dictates.

Lower Alignment

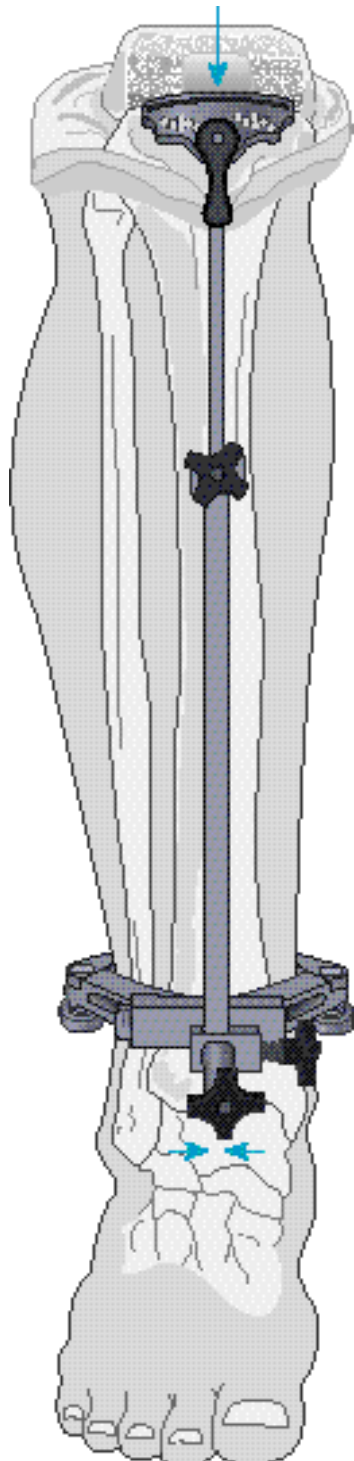


The lower assembly is translated anteroposteriorly to align it parallel to the tibial axis. Where posterior slope is desired, the assembly is advanced anteriorly, alternatively, a sloped block is used (see page 23). Up to 5° of slope is generally appropriate (5 mm advancement will produce approximately 1° additional slope). There are scribe marks at 1 cm for reference.

Mediolateral alignment is approximately parallel to the tibial axis, but as the lateral malleolus is more prominent, bisecting the transmalleolar axis will prejudice the cut into varus. The midline of the tibia is approximately 3 mm medial to the transaxial midline. The lower assembly is translated medially to the palpable anterior crest of the tibia, usually to the second vertical mark. There are scribe marks at 3 and 6 mm for reference. Where the platform is medially displaced, adjustment is made at the lower assembly.

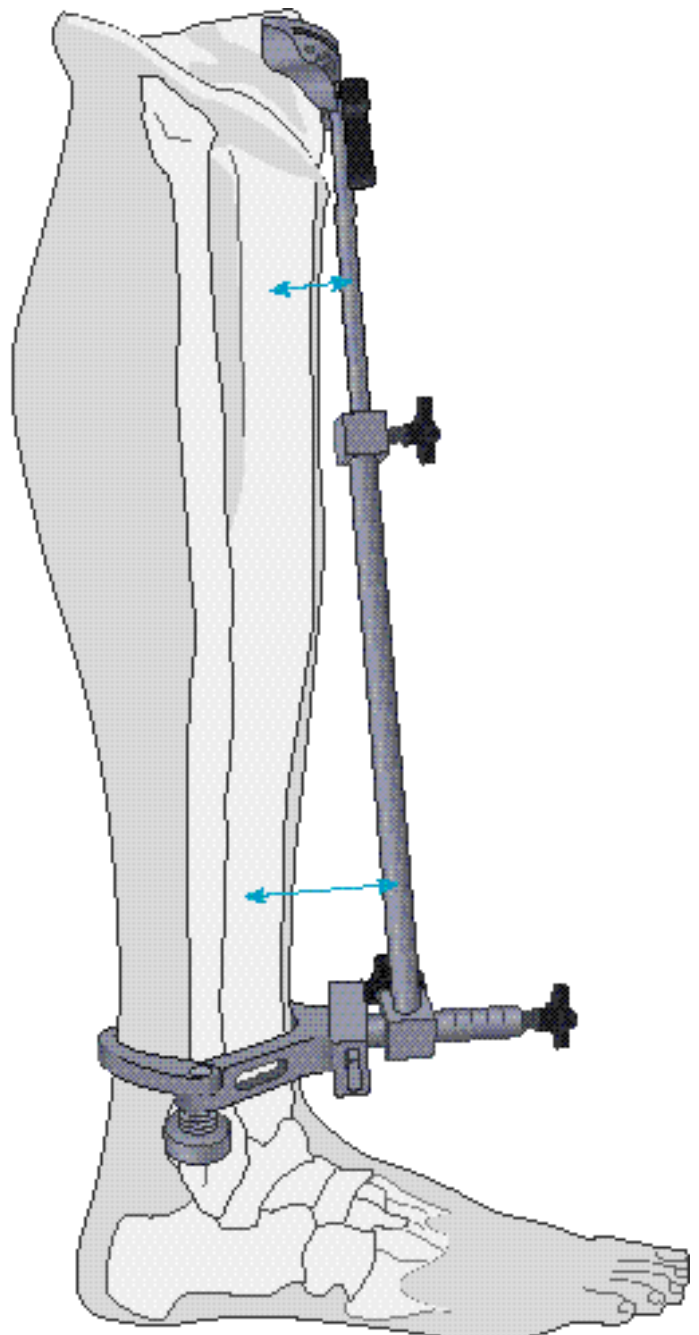
The Tibial Alignment

The distal portion of the long arm of the tibial alignment device should align with the centre of the talus.



Lateral alignment is similarly confirmed.

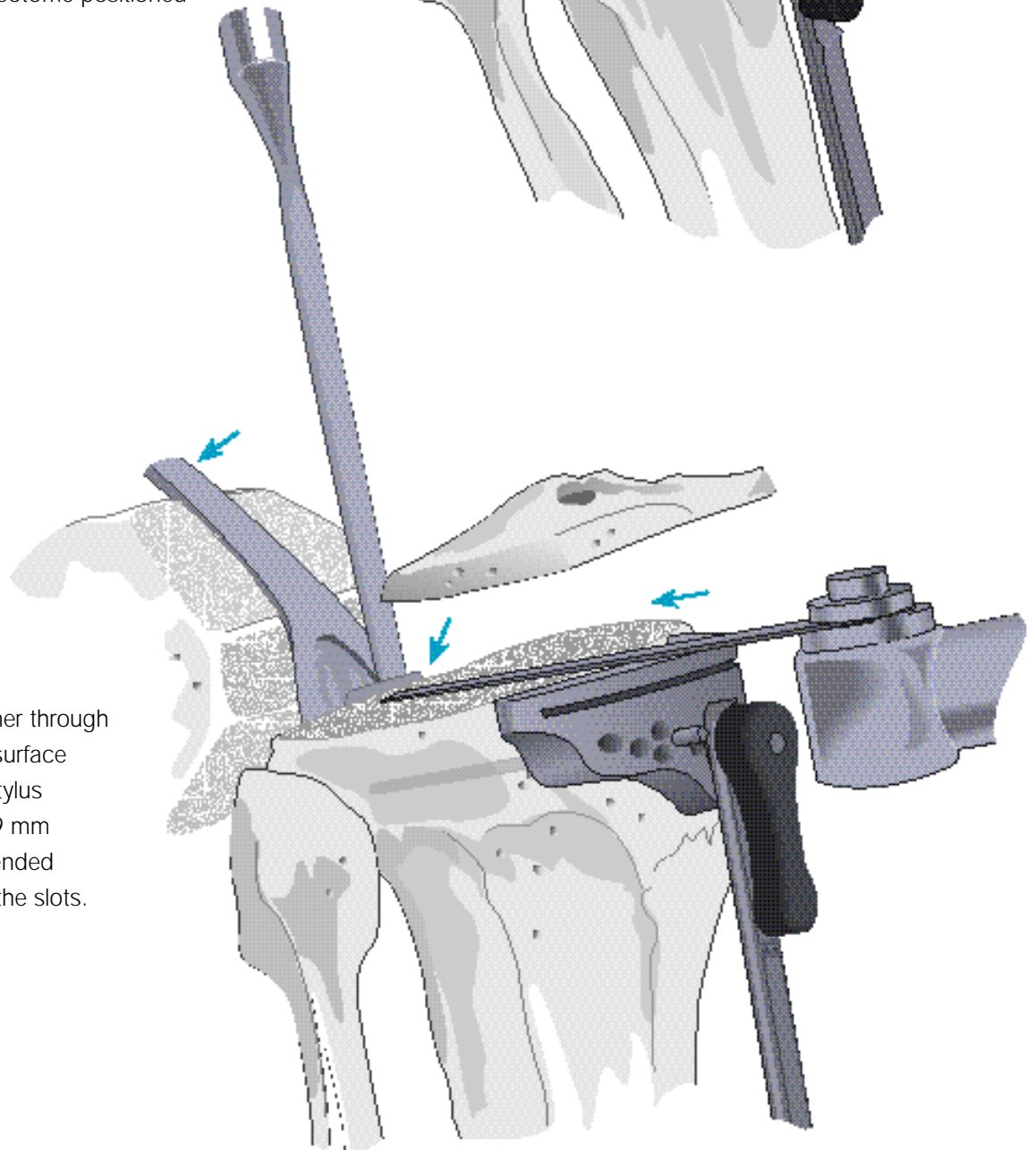
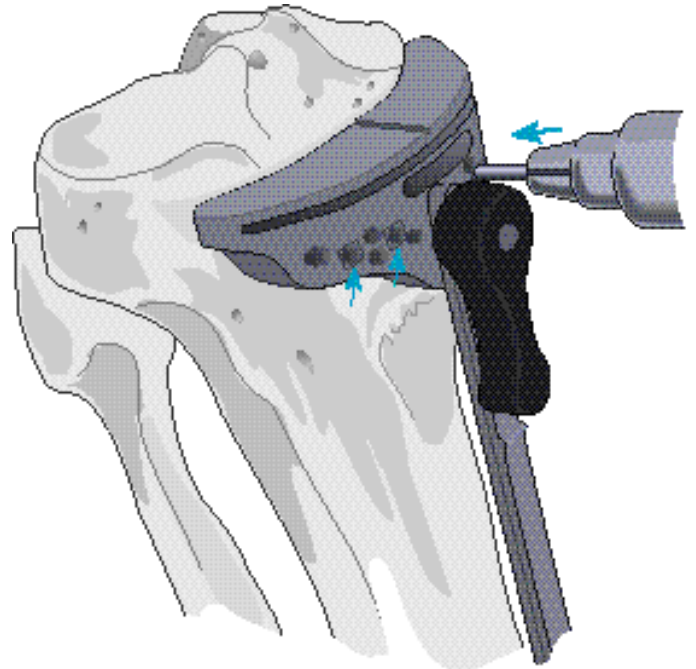
Note: Where indicated, varus/valgus corrections are made by sliding the distal portion of the tibial alignment to the appropriate location.



Securing the Platform and Tibial Resection

Steinmann pins or 3.2 mm ($\frac{1}{8}$ ") diameter drill bits are introduced through the central holes marked with a □, into the tibia stopping well short of the posterior cortex. The tibial alignment device can either be removed by first unlocking the cutting block, or left in place for additional stability.

An entry slot is cut with a narrow oscillating saw into the intercondylar eminence anterior to the attachment of the PCL and an osteotome positioned to shield the ligament.



Resection is made either through the slot or on the top surface depending upon the stylus reference used. A 1.19 mm saw blade is recommended when cutting through the slots.

Patellar Resurfacing

It is important that the sagittal dimension and accurate tracking are maintained and that adequate bone stock is preserved. Problems will arise from inadequate or oblique resection resulting in greater thickness to the complex, asymmetric positioning of the implant, subsequent patellar tilt and implant wear.

It is important that sufficient soft tissue be freed at the prepatellar bursa to position the calipers at the anterior cortex.

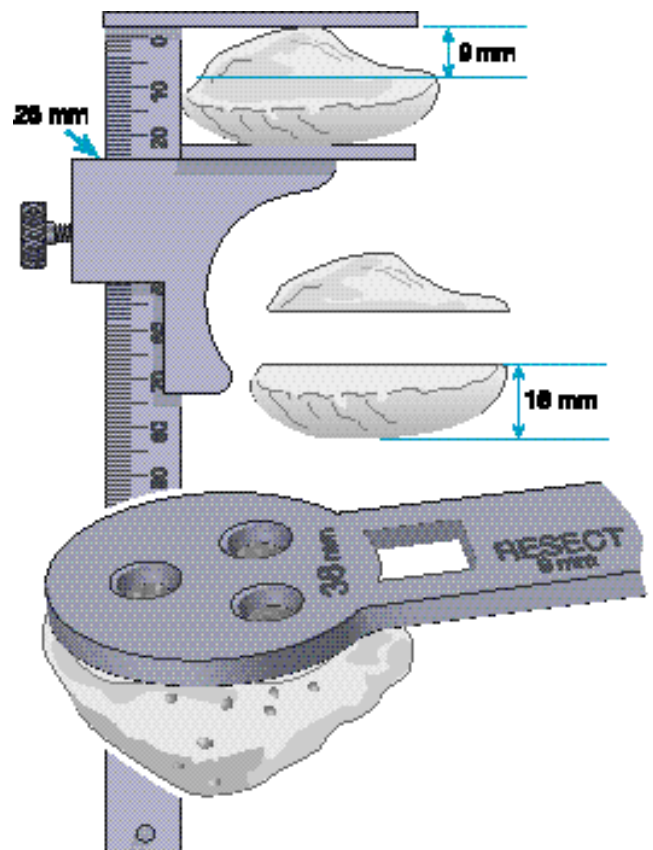
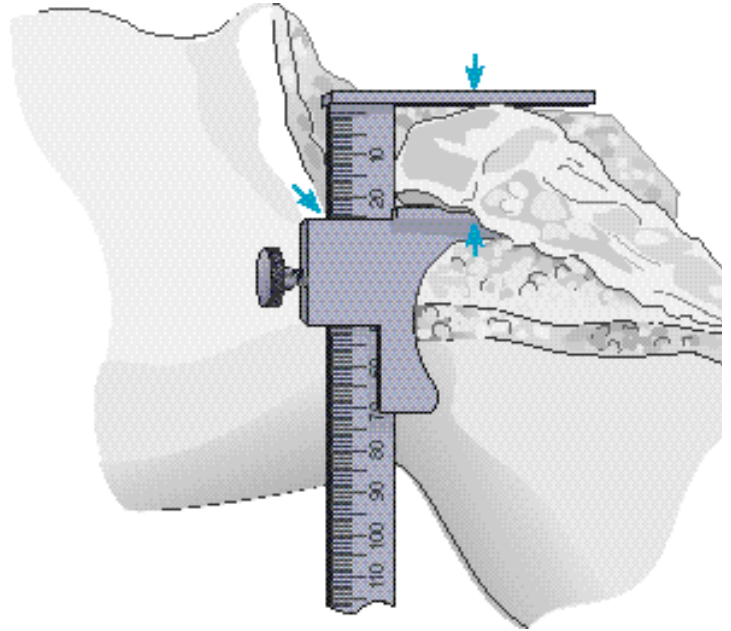
The greatest sagittal dimension is at the median ridge. The normal range is 20-30 mm. The dimension is established and an amount corresponding to the size of the selected implant subtracted. The remainder equals the target dimension following resection. Where the patella is small, a minimal residual dimension of 12 mm should be maintained.

Example: (for a 38 mm size dome or oval/dome patella) From a patella 25 mm thick, 9 mm of articular surface is resected, yielding 16 mm of residual bone to accommodate the 9 mm thick implant.

The template is selected that most adequately covers the articular surface without overhang. The handle is positioned on the medial side of the everted patella. Where bone is deficient on the lateral side, the next smaller size is selected, but positioned slightly to the medial side to enhance patellar tracking.

The amount of appropriate bone resection, as indicated on the template, is noted.

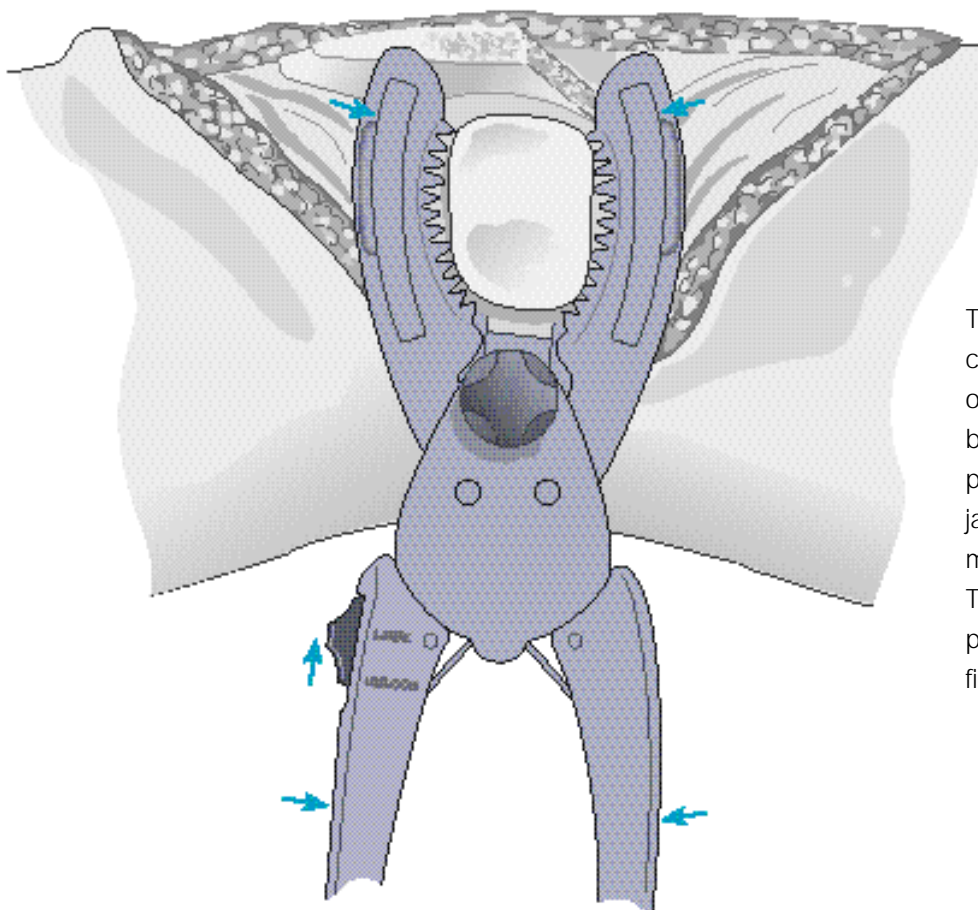
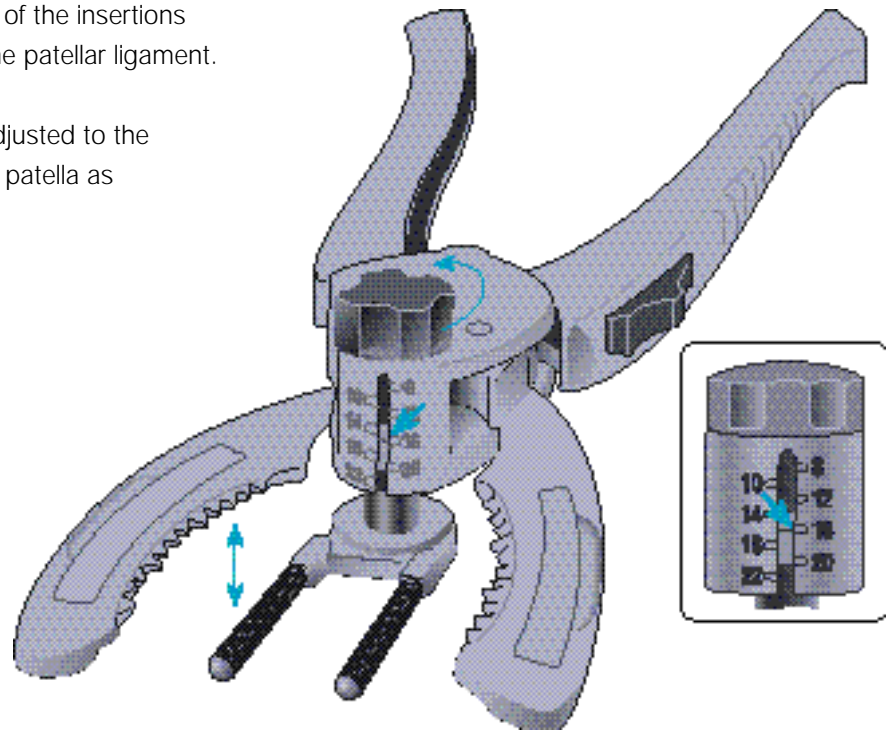
Patellar size	Resection
32 mm	8.0 mm
35 mm	8.5 mm
38 mm	9.0 mm
41 mm	11.5 mm



The Patellar Cutting Guide

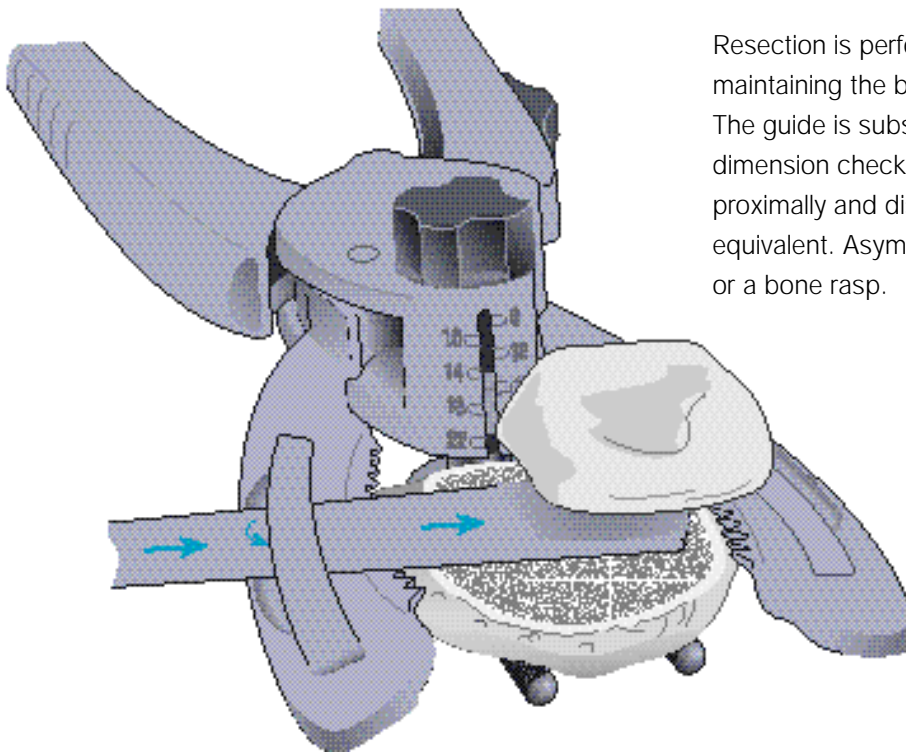
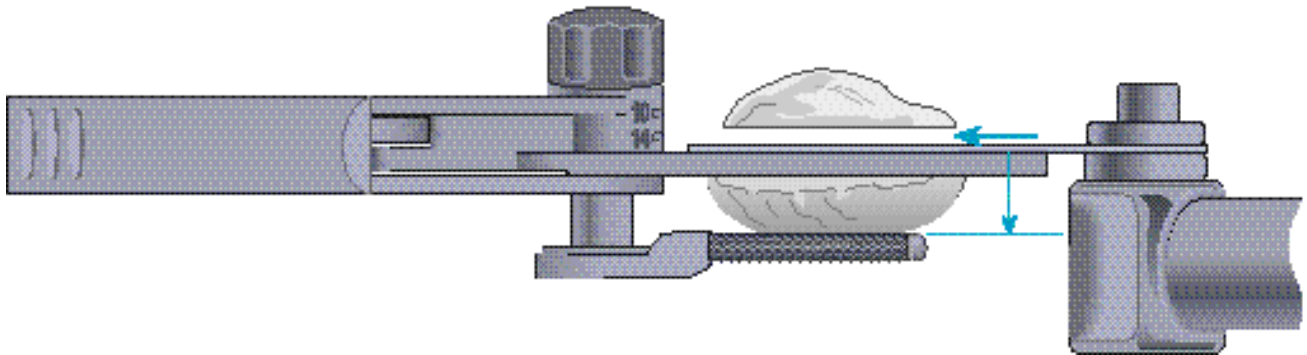
Synovial tissue is cleared to the level of the insertions of the quadriceps mechanism and the patellar ligament.

The prongs of the knurled fork are adjusted to the predetermined dimension of residual patella as indicated on the calibrated column.



The leg is placed in extension, the cutting guide positioned with prongs of the fork deep to the prepatellar bursa and against the anterior patellar cortex with the serrated jaws at the superior and inferior margins of the articular surface. The switch is placed to the LOCK position and the jaws closed to firmly engage the patella.

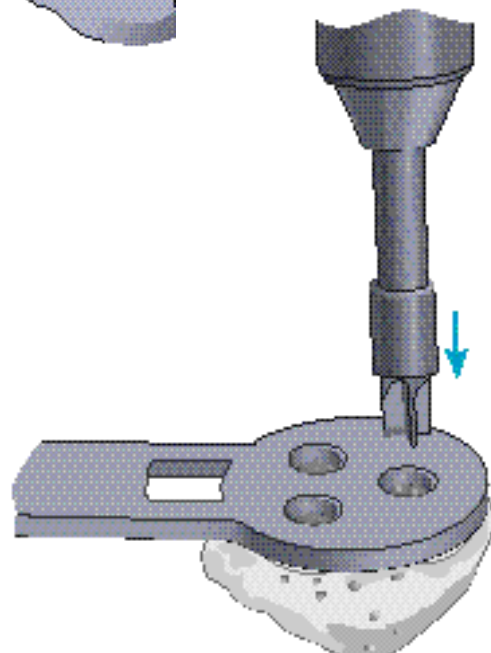
Resection and Drilling



Resection is performed with an oscillating saw, maintaining the blade flush to the cutting surface. The guide is subsequently removed and the residual dimension checked with calipers, laterally, medially, proximally and distally. All measurements should be equivalent. Asymmetry is addressed with the saw or a bone rasp.

Alternatively, the saw blade is inserted into the well of the cutting surface of either of the jaws. The insert is lifted and the blade thereby confined within the slot created, ensuring that the cut will remain flush to the cutting surface. A 1.19 mm saw blade is recommended.

The previously selected template is positioned onto the cut surface with the handle positioned on the medial side of the everted patella, such that two drill holes lie at the medial side, one at the lateral. The template is firmly engaged to the resected surface and holes fashioned with the appropriate drill bit.

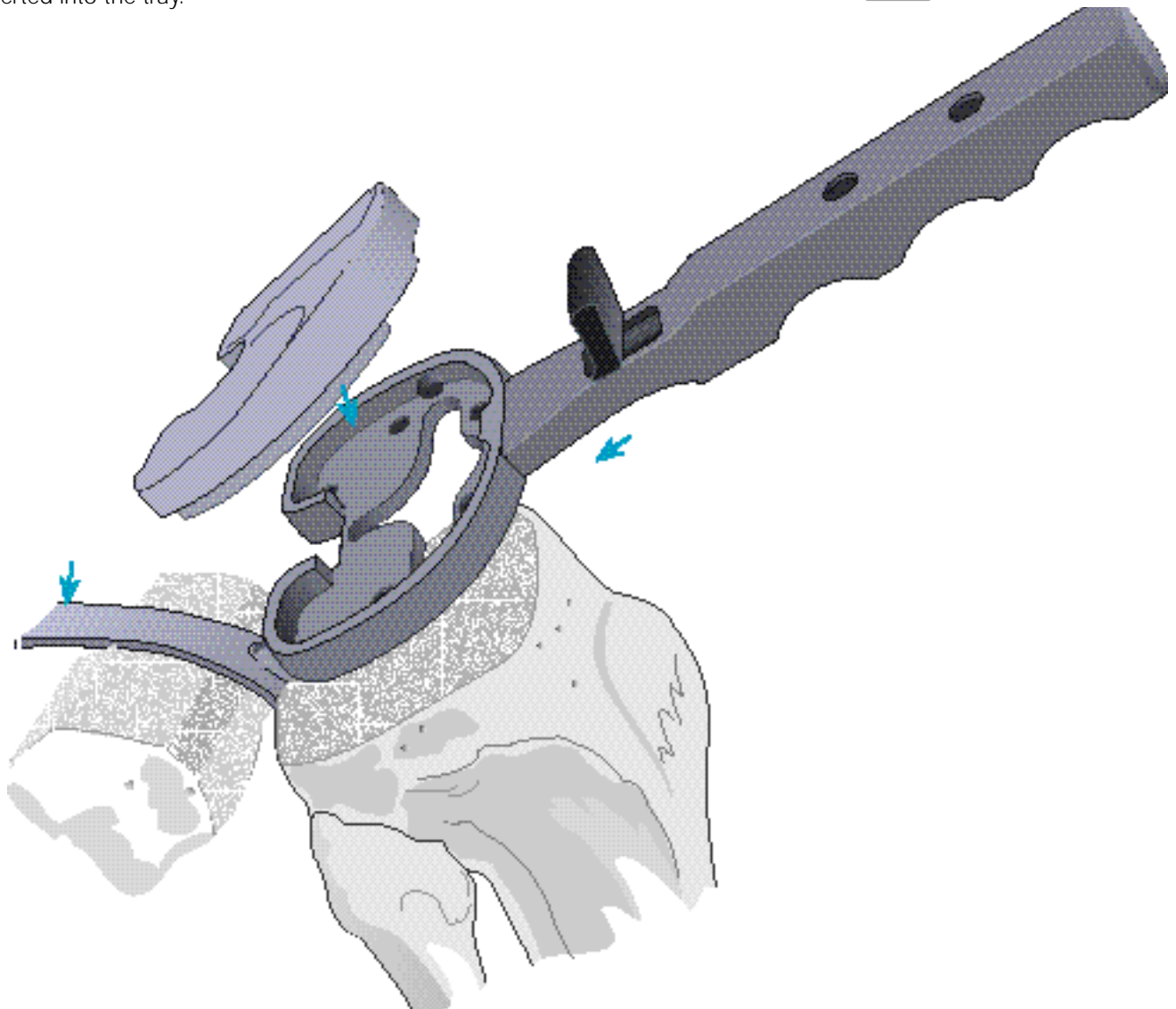
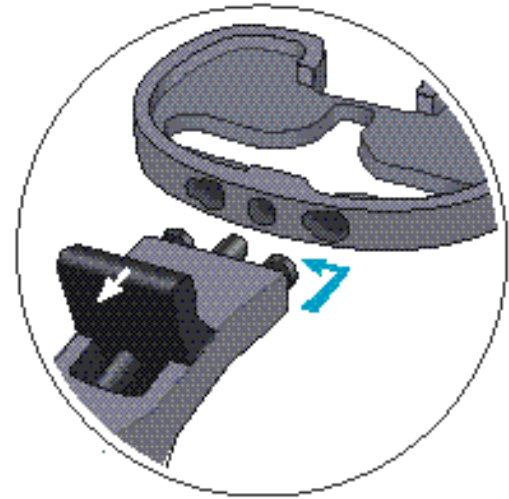


The Trial Tibial Component

The knee is placed in maximal flexion, the tibia subluxed anteriorly with the tibial retractor. The tibial tray is selected which provides the greatest coverage of the prepared surface without overhang anterior to the midcoronal plane.

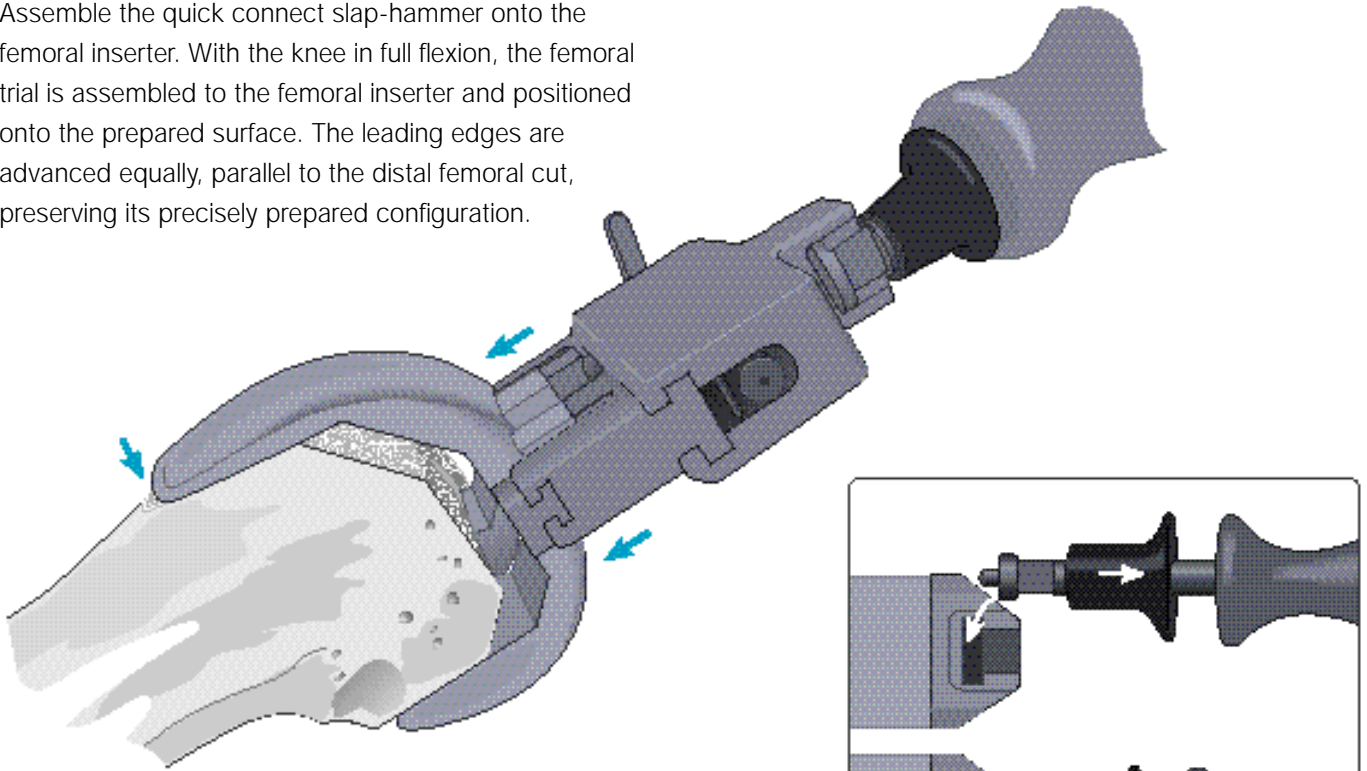
The tibial tray alignment handle is connected to the tibial tray trial by retracting the knob, inserting the two pins into the anterior portion of the tray trial, indexing the handle to the left and releasing the knob.

The matching colour-coded plastic trial is selected and inserted into the tray.

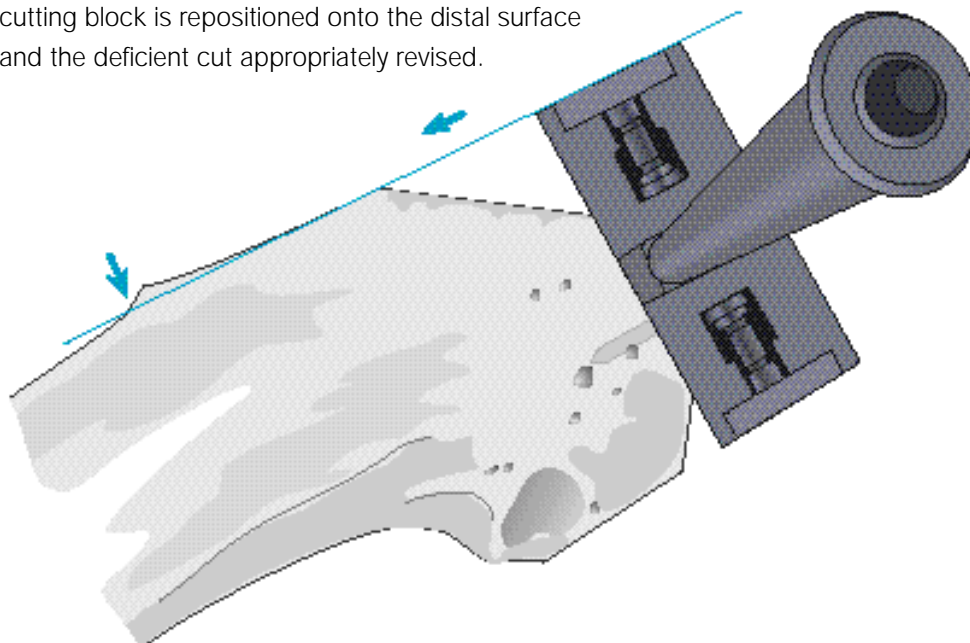


The Trial Femoral Component

Assemble the quick connect slap-hammer onto the femoral inserter. With the knee in full flexion, the femoral trial is assembled to the femoral inserter and positioned onto the prepared surface. The leading edges are advanced equally, parallel to the distal femoral cut, preserving its precisely prepared configuration.



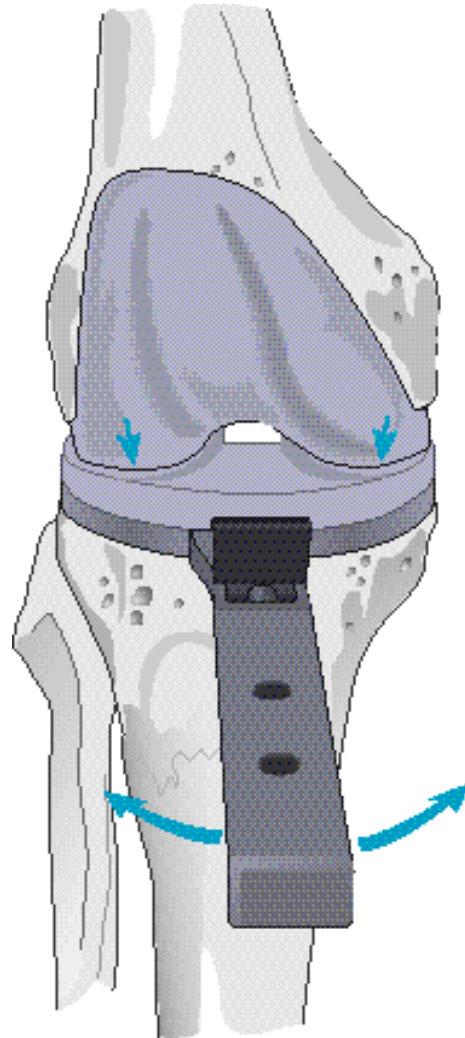
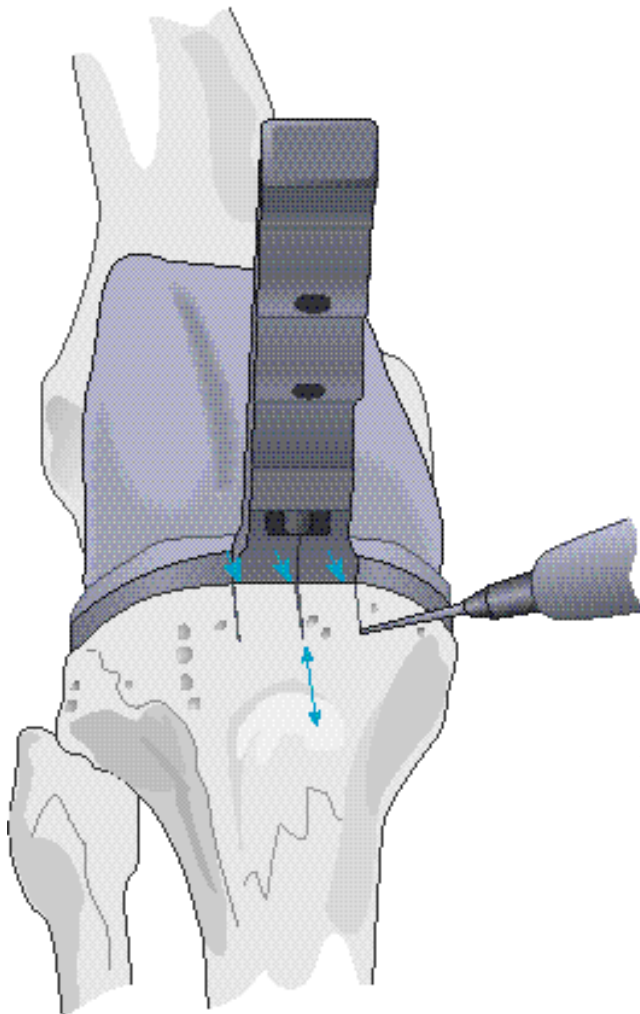
Where there is a tendency for the trial to rock posteriorly (into flexion), the most common cause is upward sloping of the anterior cut or failure to resect adequately at the anterior aspect. Less commonly, the posterior condyles have been under-resected. The A/P chamfer cutting block is repositioned onto the distal surface and the deficient cut appropriately revised.



Trial Reduction

With all trial prostheses in place, the knee is carefully and fully extended, noting medial and lateral stability and overall alignment in the A/P and M/L plane. Where there is any indication of instability, the next greater size tibial insert is substituted and reduction repeated. The insert that gives the greatest stability in flexion and extension and allows full extension is selected. Where there is a tendency for lateral subluxation or patellar tilt in the absence of medial patellar influence (thumb pressure), lateral retinacular release is indicated.

Rotational alignment of the tibial tray is adjusted with the knee in full extension, using the alignment handle to rotate the tray and trial insert into congruency with the femoral trial.

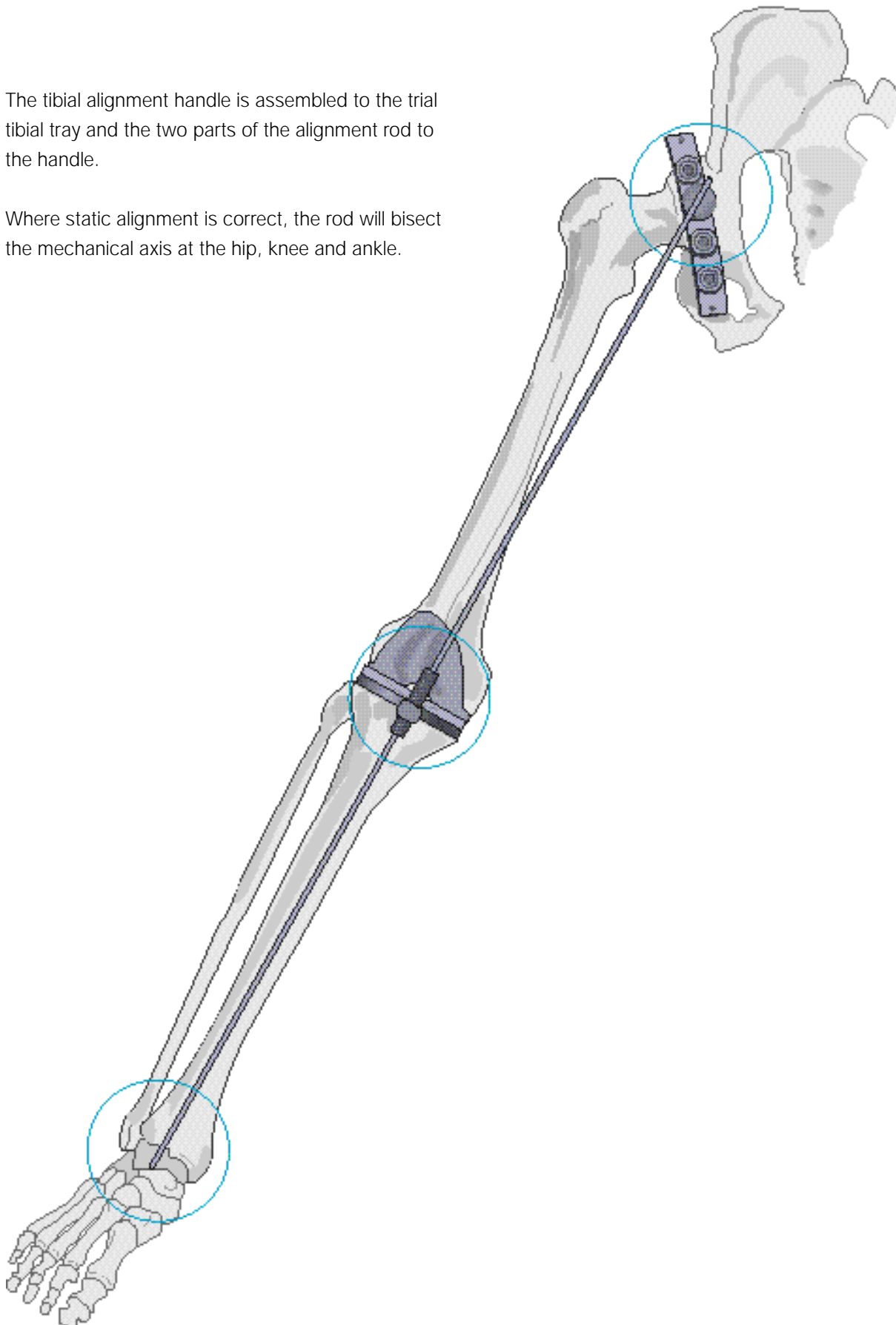


The appropriate position is marked with electrocautery on the anterior tibial cortex.

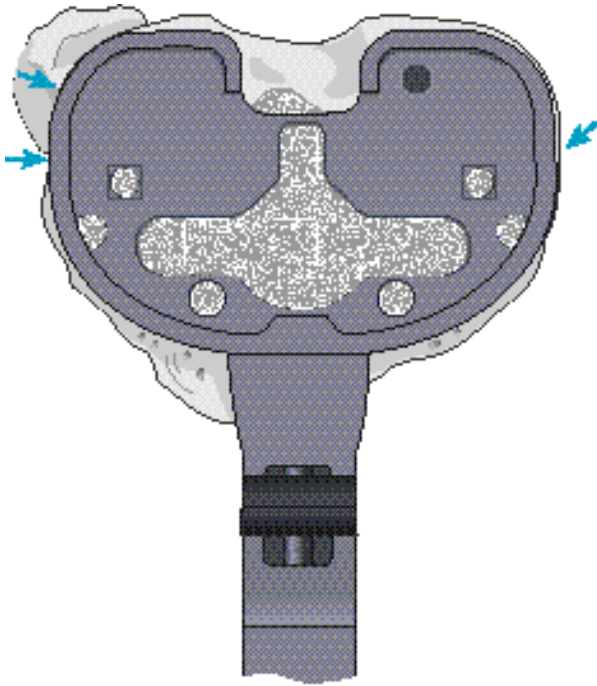
Overall Alignment

The tibial alignment handle is assembled to the trial tibial tray and the two parts of the alignment rod to the handle.


Where static alignment is correct, the rod will bisect the mechanical axis at the hip, knee and ankle.

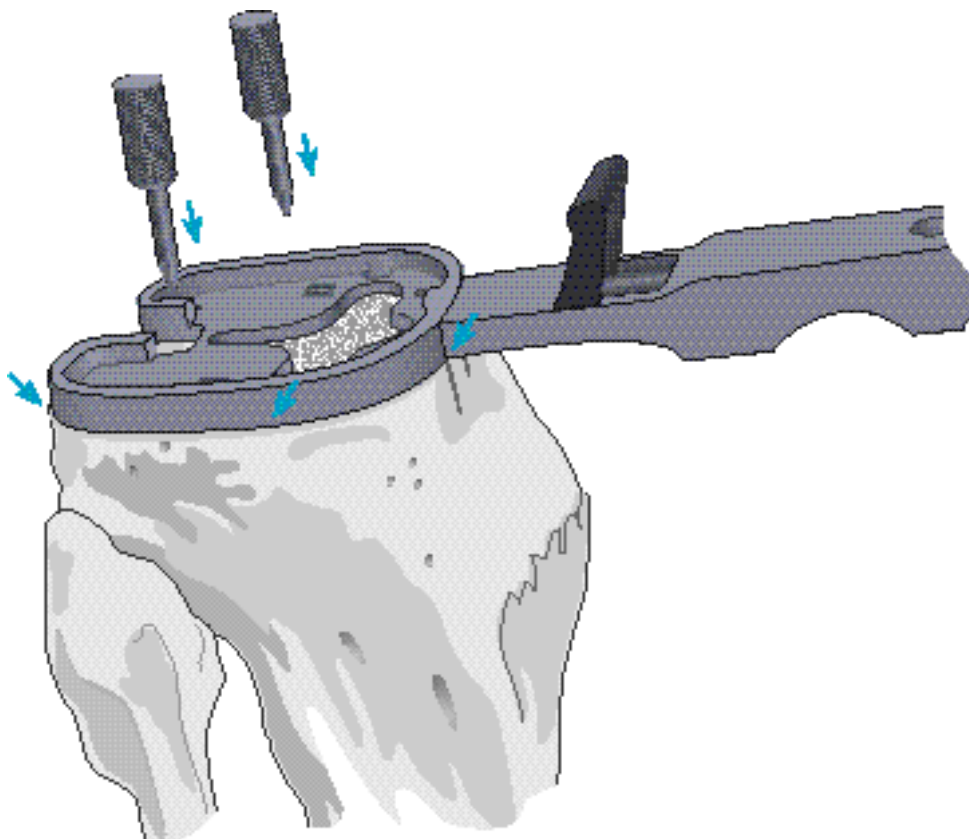


Plateau Preparation

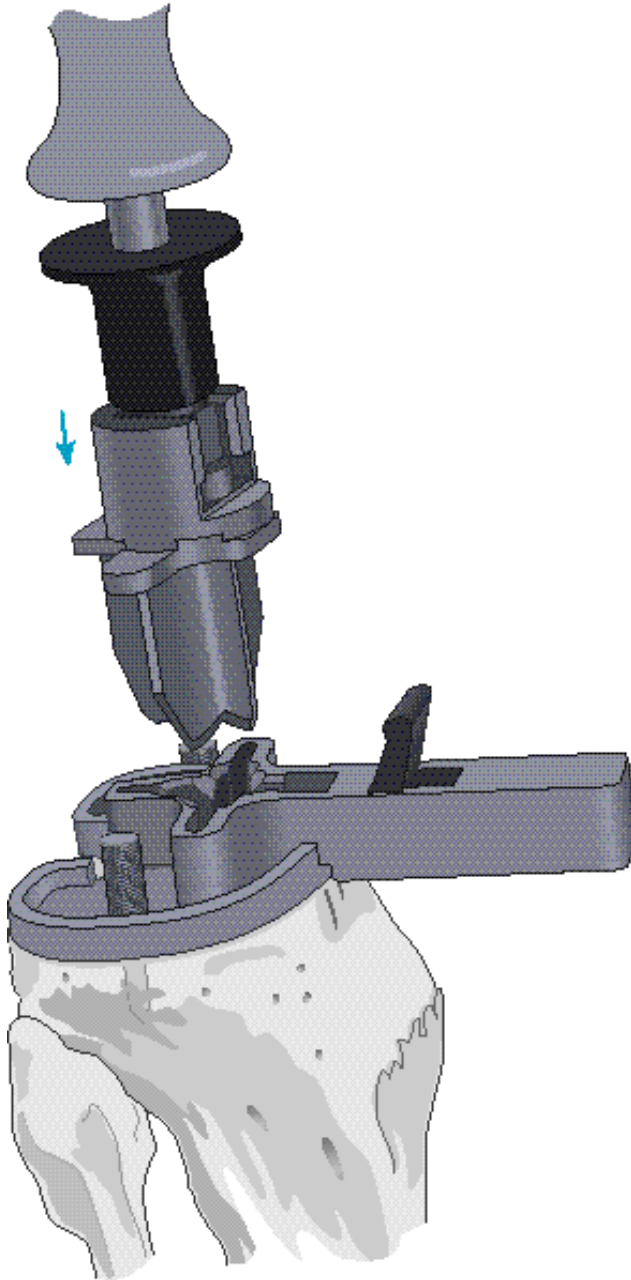


With the knee in full flexion and the tibia subluxed anteriorly, the trial tray is assembled to the alignment handle and placed onto the resected tibial surface. Care is taken that proper rotational alignment with the electrocautery marks is established.

The tray is secured with two short fixation pins inserted through the holes designated .



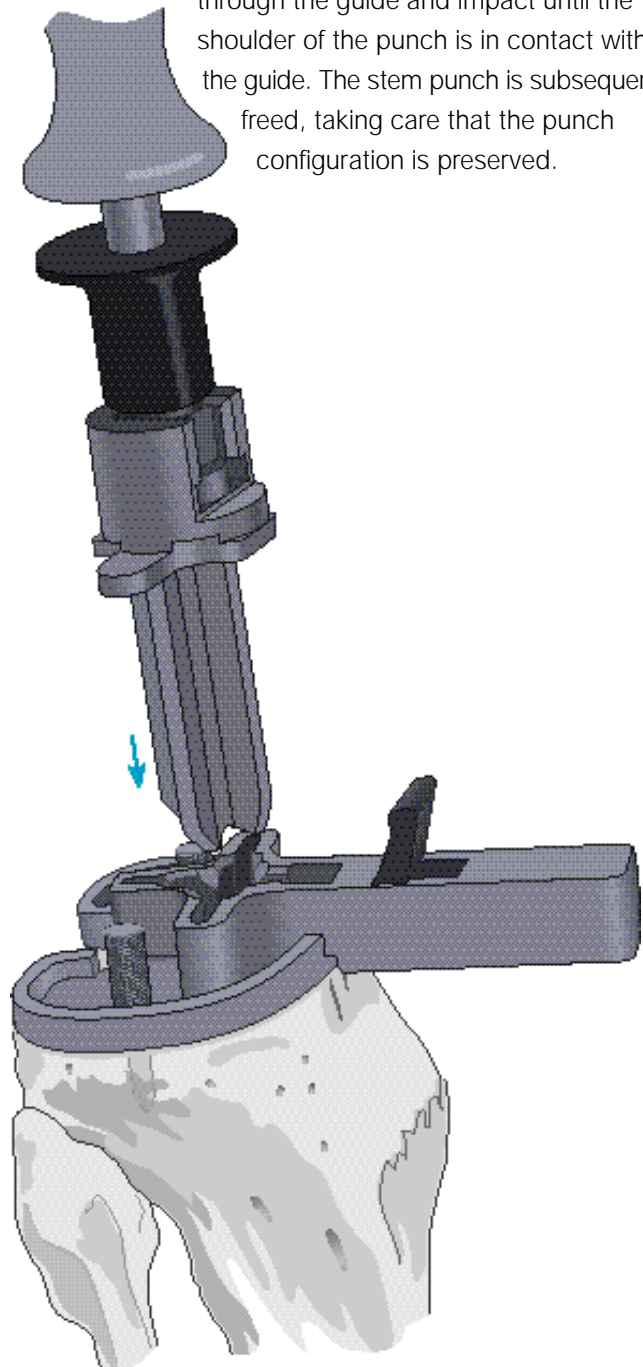
P.F.C.® Cruciform Keel Tray Preparation



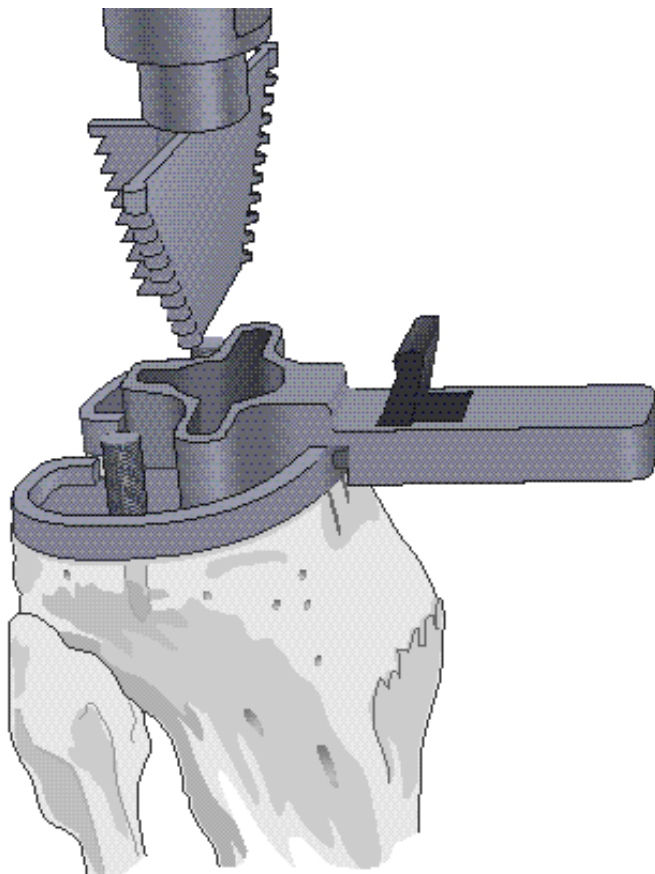
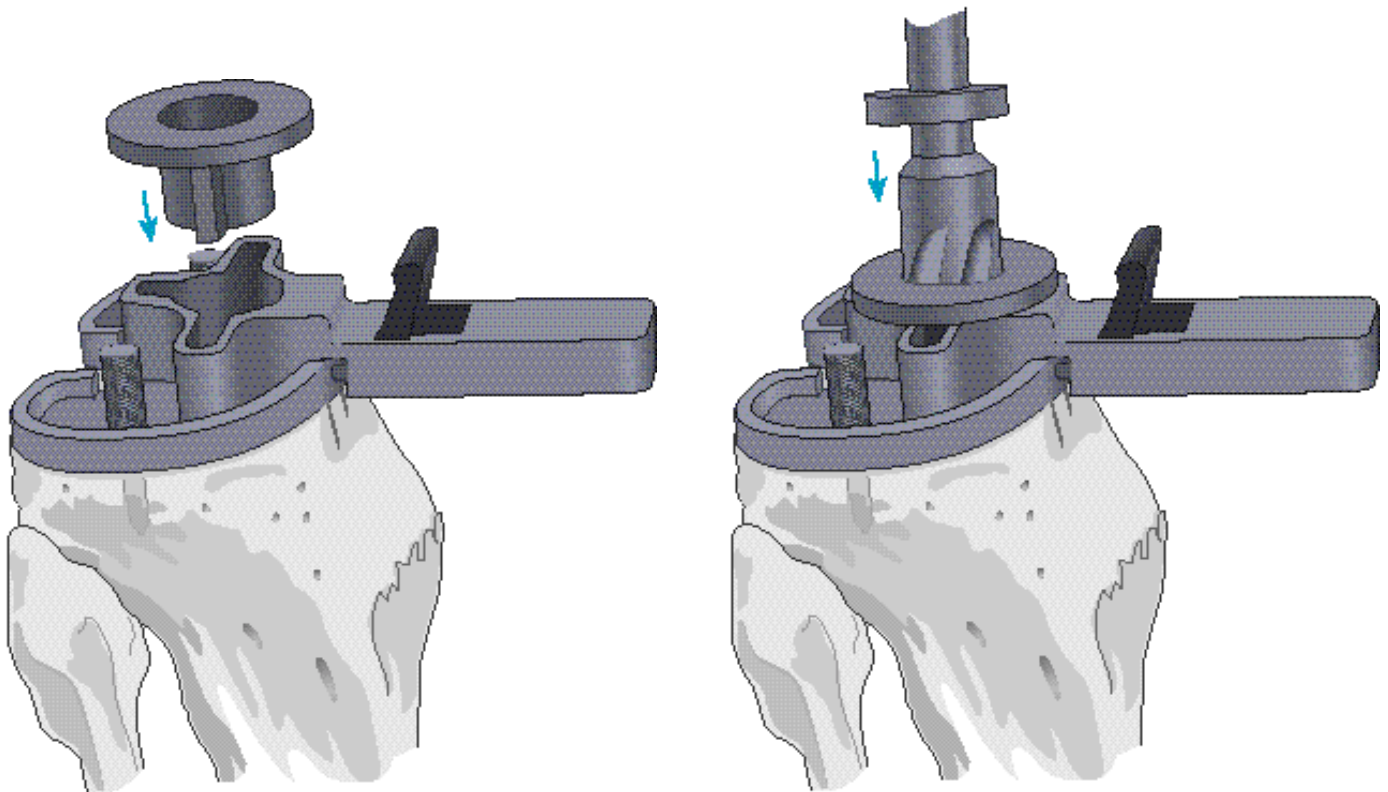
Where the cemented tray is to be implanted, assemble an appropriately sized cemented keel stem punch onto the slap-hammer and insert the punch through the guide and impact until the shoulder of the punch is in contact with the guide. The cemented stem punch is subsequently freed, taking care that the punch configuration is preserved.

Remove the alignment handle from the tray trial and assemble the appropriately sized cruciform keel punch guide to the tray trial.

Where the non-cemented tray is to be implanted, assemble an appropriately sized non-cemented keel punch onto the slap-hammer and insert the punch through the guide and impact until the shoulder of the punch is in contact with the guide. The stem punch is subsequently freed, taking care that the punch configuration is preserved.



P.F.C.® Modular Tray & UHMWPE* Tibia Preparation



Select the appropriate punch guide, drill bushing, drill and modular keel punch system. Remove the alignment handle from the tray trial and assemble the appropriately sized modular tray punch guide to the tray trial.

Seat the appropriately sized drill bushing into the modular tray punch guide.

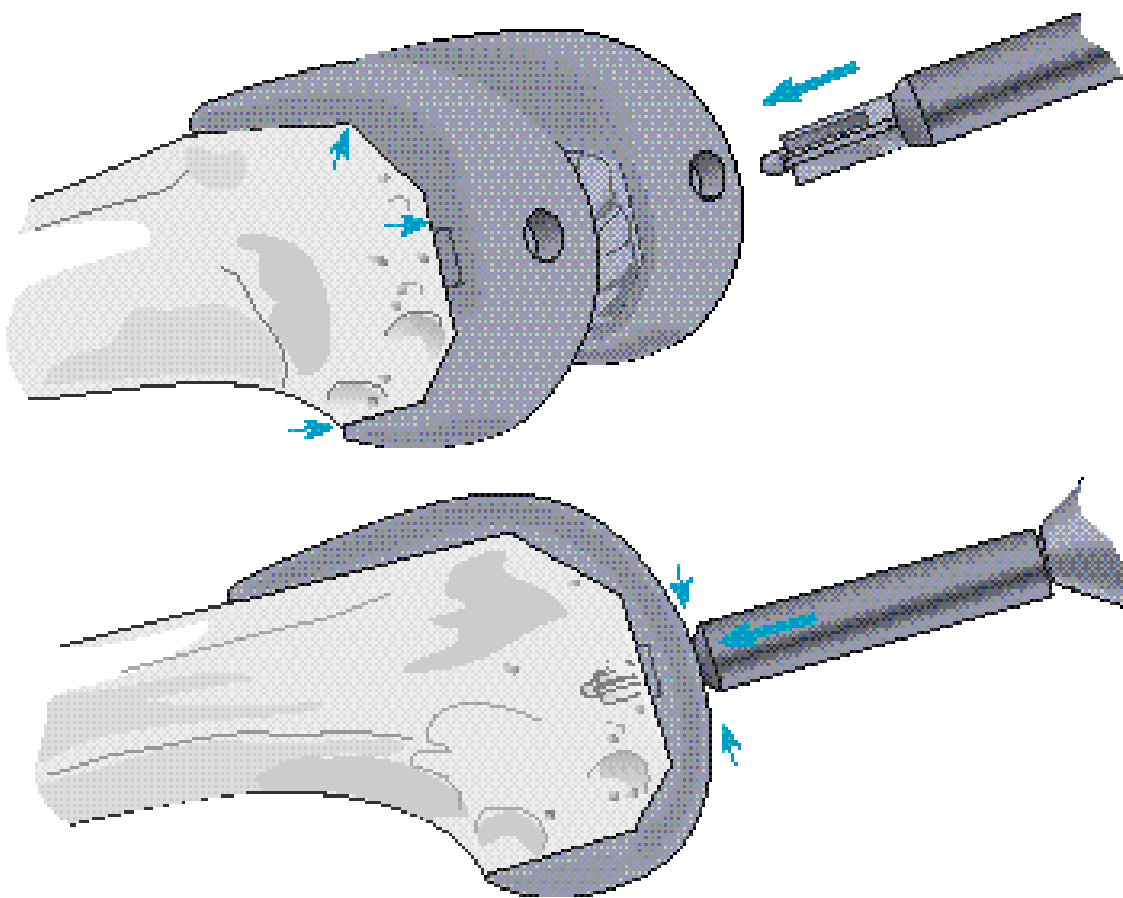
The matching drill is fully advanced through the drill bushing into the cancellous bone.

The appropriately sized modular tray keel punch is subsequently positioned through the guide and impacted until the shoulder of the punch is in contact with the guide. The modular tray keel punch is subsequently freed, taking care that the punch configuration is preserved.

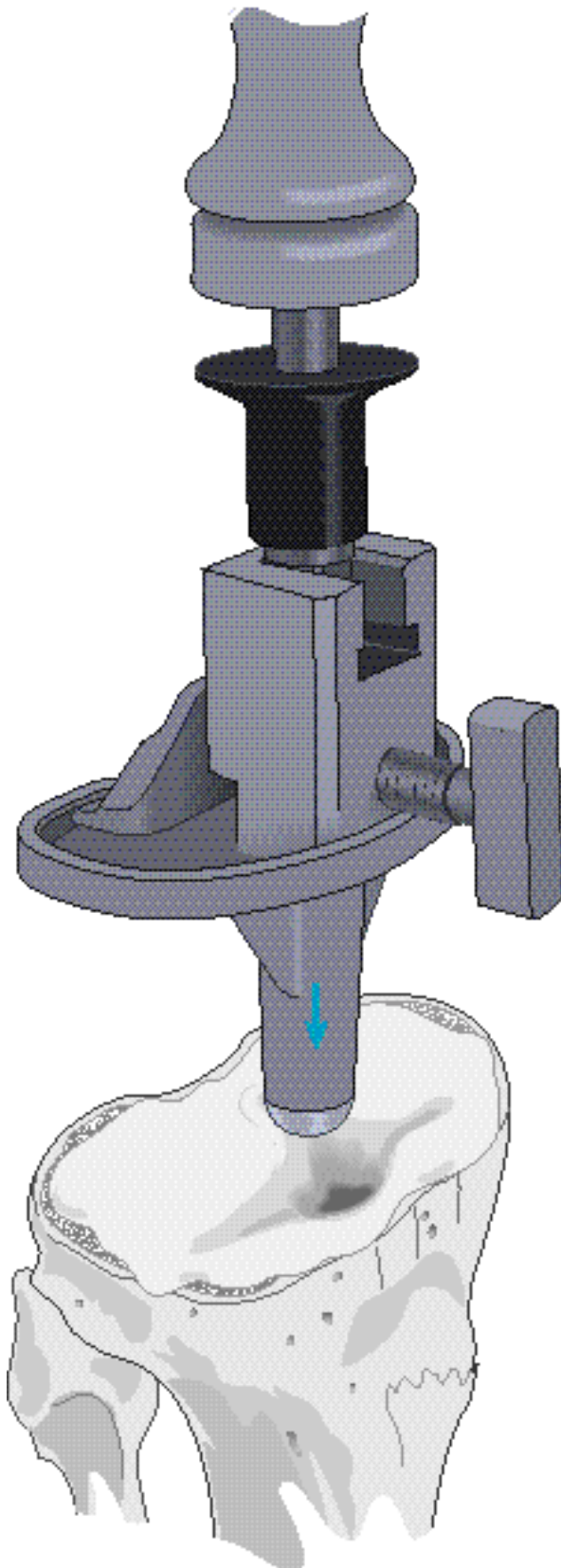
***UHMWPE (All-Poly)**

The Femoral Lug Drill

Mediolateral positioning of the femoral trial component is confirmed and receptacles prepared for the implant lugs by advancing the femoral drill through the appropriate holes.



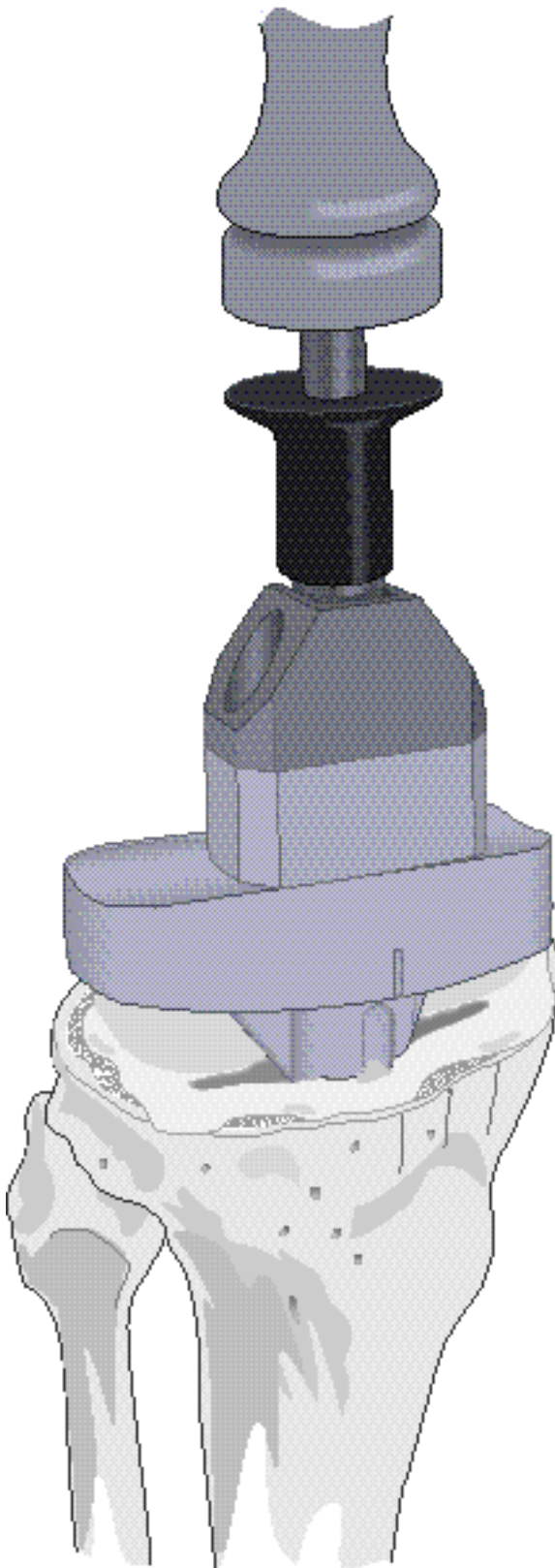
Implanting the Components



The Tibial Component

The entire site is thoroughly cleansed with pulsatile lavage. Methyl methacrylate cement is prepared and applied by syringe or digital pressure in its low viscous state to assure maximal penetration into the trabecular bone.

The universal handle is assembled onto the universal tibial tray inserter and assembled onto the tibial tray. The tray is carefully inserted, **avoiding malrotation**. When it is fully seated, several mallet blows are delivered to the top of the universal handle. The nylon tibial tray impactor may be used to further impact the tibial tray.



UHMWPE Tibial Component

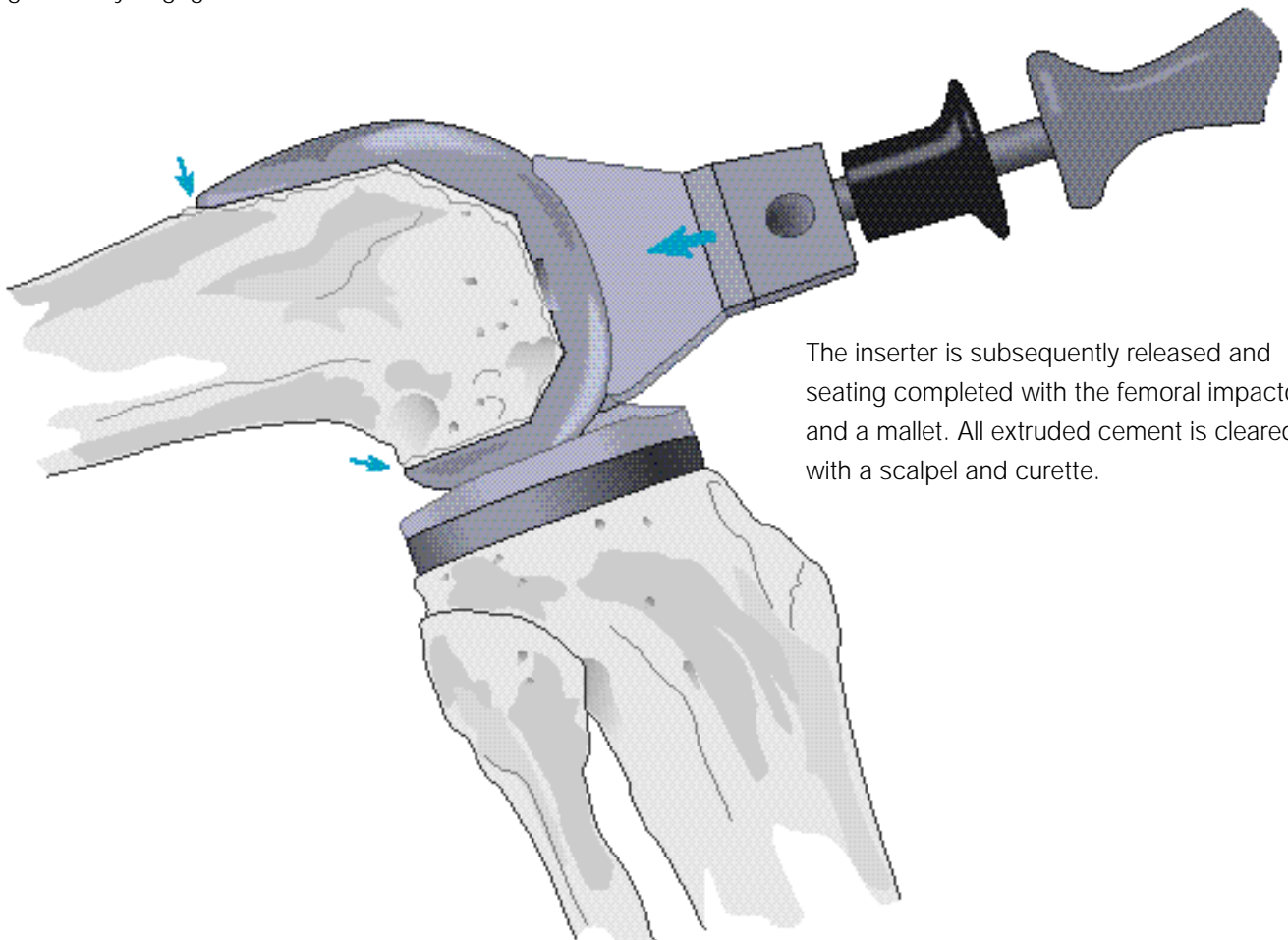
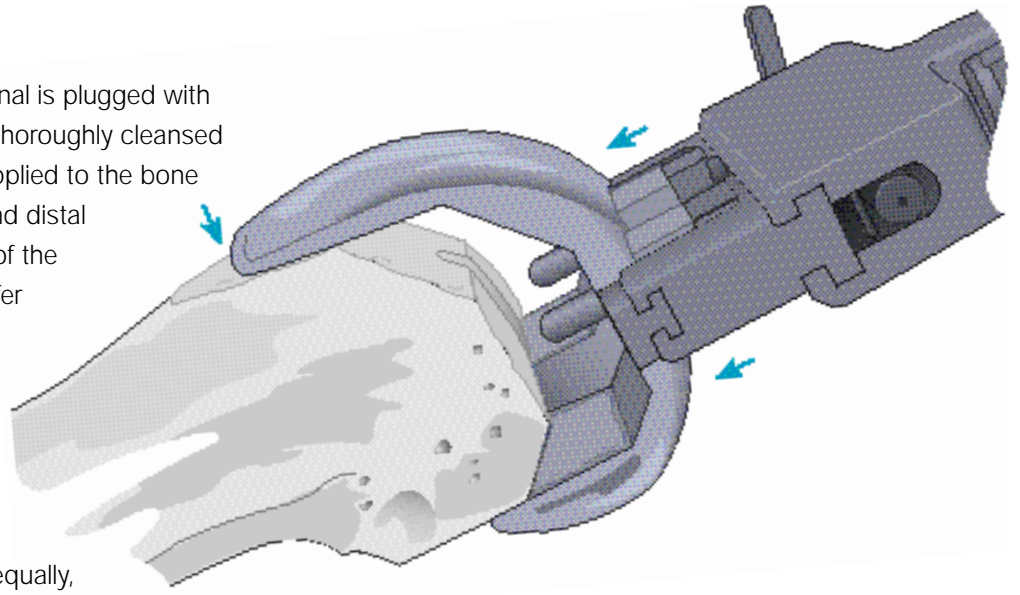
Alternatively, when implanting an all-UHMWPE tibial component, place the component in appropriate orientation and impact the flat central proximal portion of the component with the nylon tibial tray impactor. Excess cement is removed from the periphery of the tibial plateau, and a final impaction is performed to ensure complete seating of the component.

Cement Pressurisation

As the cement polymerises, a trial component is positioned on the prepared femur. The knee is placed in full extension to maintain pressure at the bone/tibial implant interface. Slight valgus stress is maintained to ensure that the tibial implant does not tilt into varus. When the cement has set, the knee is placed in flexion and the trial femoral component removed. All extruded cement is carefully removed with special attention to the posterior compartment.

The Femoral Component

The entry hole at the medullary canal is plugged with cancellous bone. All surfaces are thoroughly cleansed with pulsatile lavage. Cement is applied to the bone at the anterior, anterior chamfer and distal surfaces and to the inner surface of the component at the posterior chamfer and posterior condylar recesses. Care is taken to avoid the articular surface of the implant. The implant is assembled onto the femoral inserter. Care is taken that it is correctly oriented. The leading edges are advanced equally, parallel to the distal surface and protecting the carefully configured surfaces, until the lugs are fully engaged.

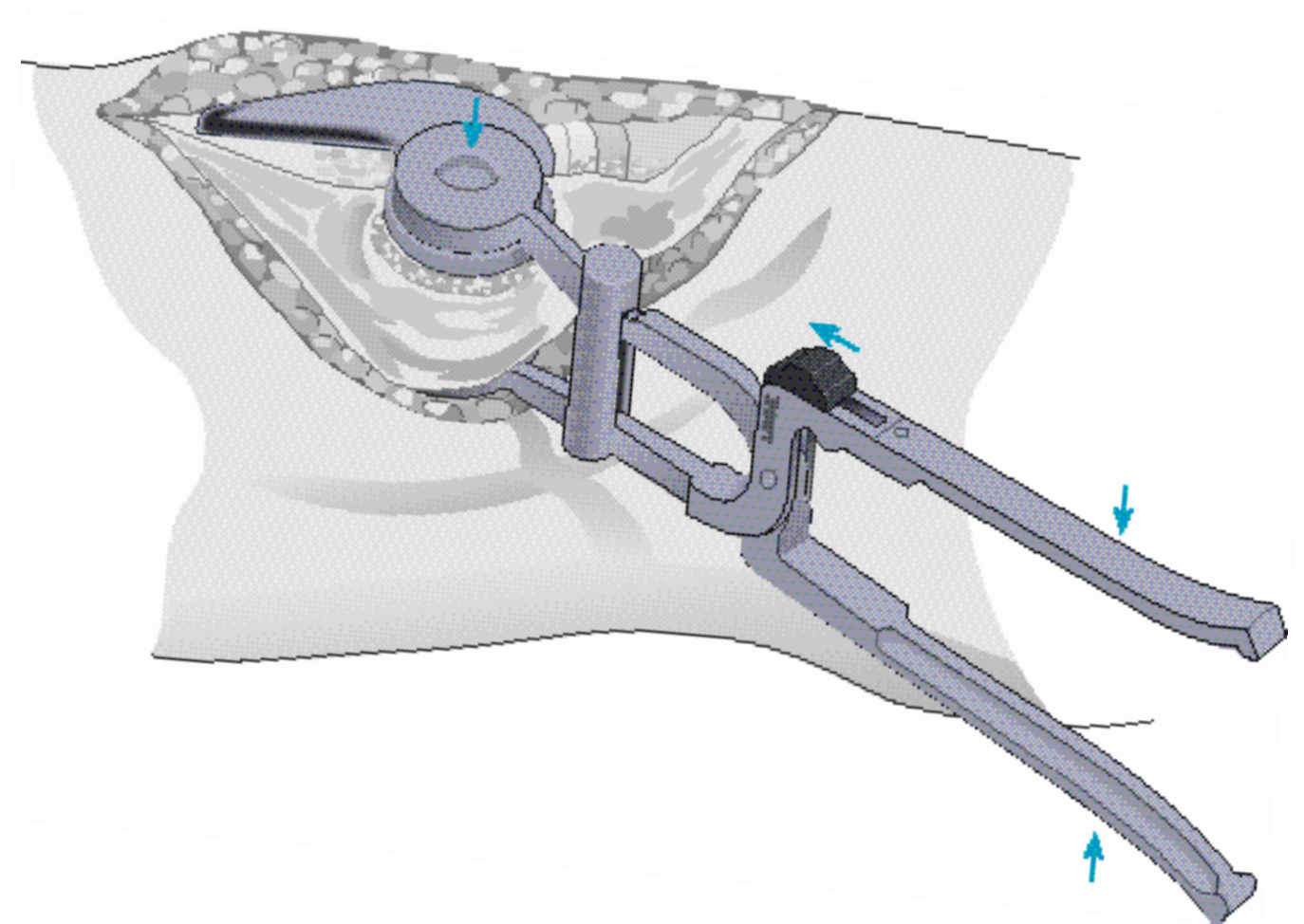


The inserter is subsequently released and seating completed with the femoral impactor and a mallet. All extruded cement is cleared with a scalpel and curette.

The Patellar Component

The patellar implant may be cemented at the surgeon's convenience with either of the other components. The cut surface is thoroughly cleansed with pulsatile lavage. Cement is applied to the surface and the component inserted.

The patellar clamp is designed to fully seat and stabilise the implant as the cement polymerises. It is positioned with the silicon O-ring centred over the articular surface of the implant and the metal backing plate against the anterior cortex, avoiding skin entrapment. When snug, the handles are closed and held by the ratchet until polymerisation is complete. Excessive compression is avoided as it can fracture osteopenic bone. All extruded cement is removed with a curette. To release the clamp, place the locking knob in the unlocked position and squeeze the handles together to release the pawl.



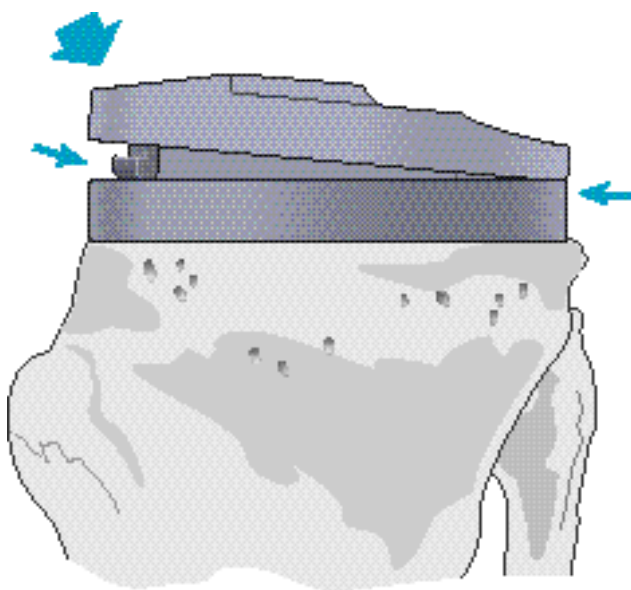
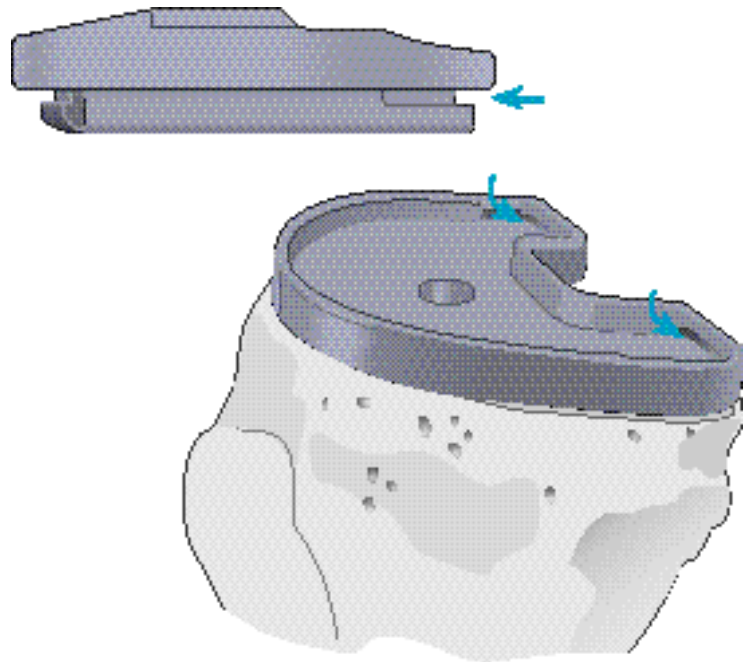
The Tibial Insert

The trial insert is removed and the permanent insert introduced into the implanted tibial tray and seated posteriorly, its anterior margin resting on the lip.

The anterior margin is tapped with a nylon mallet, deflecting it past the lip of the tray into position. Seating is confirmed by circumferential inspection.

Alternatively, the permanent insert may be inserted at any convenient time during the cementing procedure.

When a curved insert topography is utilised and the flexion gap is snug, it may be difficult to extract a trial insert and introduce the permanent one. In such a case, the permanent insert should be implanted prior to cementing the femoral component.



Closure

The tourniquet is released and bleeding controlled by electrocautery. A closed-wound suction drain is placed in the suprapatellar pouch and brought out through the lateral retinaculum. The fat pad, quadriceps mechanism, patella tendon, and medial retinaculum are reapproximated with interrupted sutures.

The knee is put through a range of motion from full extension to full flexion to confirm patellar tracking and the integrity of the capsular closing. The final flexion against gravity is noted for post-operative rehabilitation.

Subcutaneous tissue is reapproximated and the skin closed with sutures or staples.

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