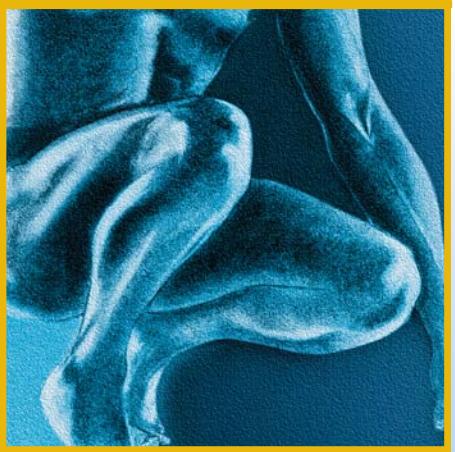
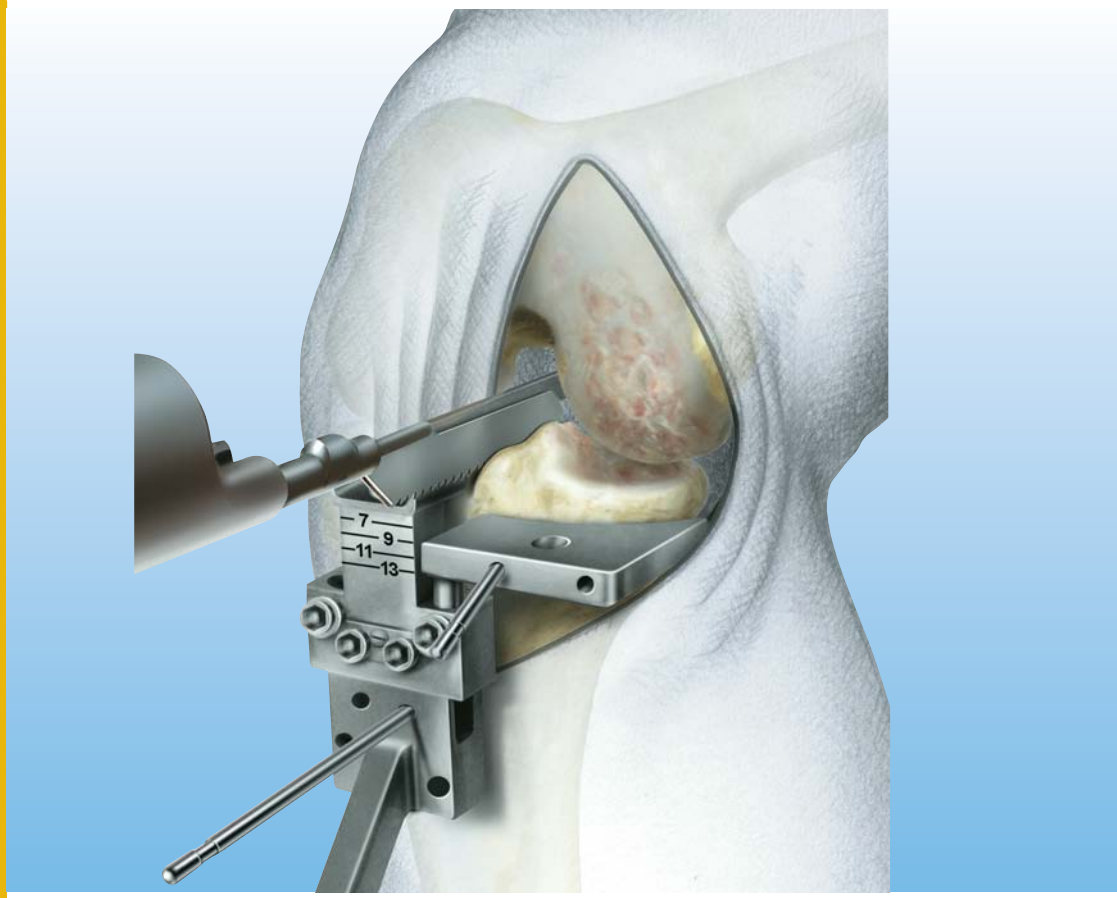
LINK®





MITUS®

Minimally Invasive Technique for Unicondylar Sled Prosthesis Endo-Model®

Surgical Technique

The MITUS® Technique was designed in conjunction with the following surgeons:

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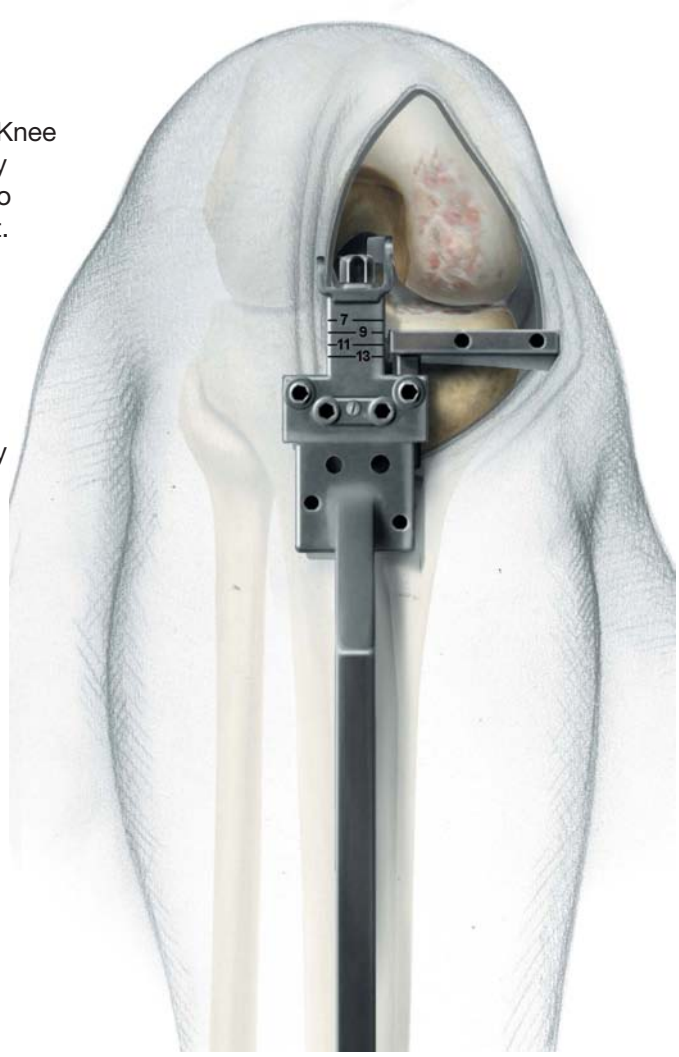
Minimally Invasive Technique for Unicondylar Sled Prosthesis Endo-Model®

Rünow Minimally Invasive Surgical Technique

There are well defined indications for Unicompartmental Knee Prostheses. The concept is based on the fact that in early stages of osteoarthritis (OA) the cartilage loss is limited to a single compartment without patello-femoral involvement.



The **LINK® Sled Prosthesis** design allows for tibial and femoral bone cuts with a minimum of bone removal preserving the hard subchondral bone, for secure long-term fixation.

The newly developed **Tibial Saw Guide** helps to accurately restore the normal biomechanics and ensures precise, reproducible bone cuts.

The MITUS® Instruments offer distinct **advantages** to the surgeon:

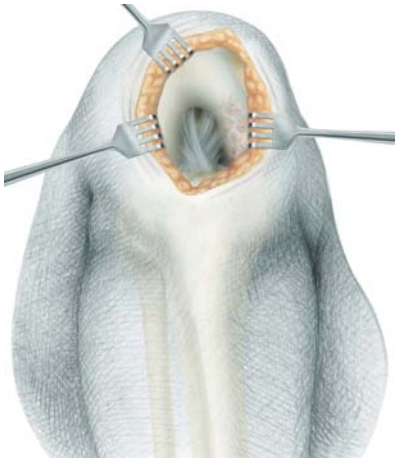
- minimal bone resection
- full control of the tibial cut
- ability to try out sizes using trial implants
- the choice between either a traditional or a minimally invasive surgical technique
- instruments can be used either medially or laterally

The surgical exposure can be performed in one of two ways:

Traditional exposure: through a midline or a medial parapatellar skin incision. The joint cavity is exposed through a medial parapatellar incision, splitting the quadriceps tendon. The patella is everted laterally.

Minimally invasive exposure: through a short parapatellar skin incision. The capsular incision is also parapatellar allowing access to the joint with minimal disturbance of the extensor mechanism and without dislocating the patella.

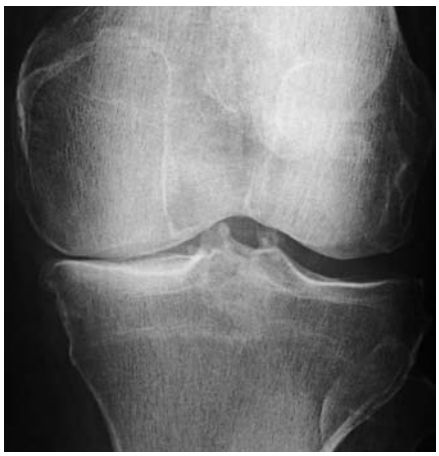
The minimally invasive technique diminishes morbidity, and with proper use of the LINK® Instruments, can be performed with great precision.



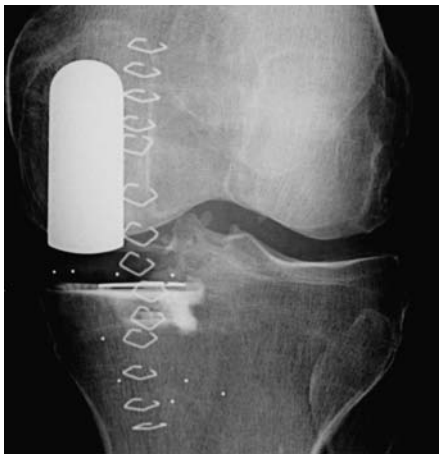
Indications

- Early stages of unicompartmental osteoarthritis of the knee
- Intact ligamentous structures
- Sedentary or light physical activities

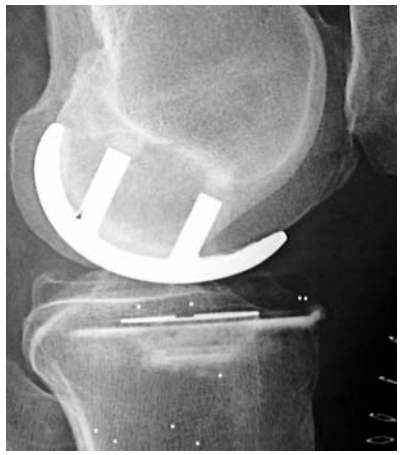
Case History



1a



1b

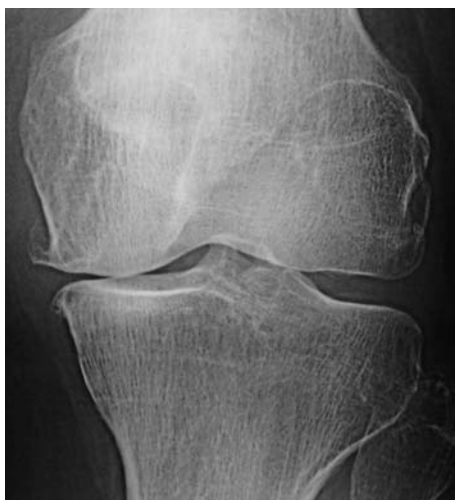


1c

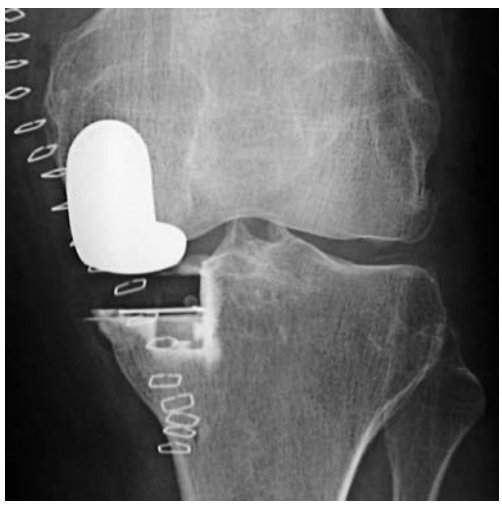
Male, age 75 years

Fig. 1a: Medial compartment OA, Ahlbäck Grade II, with pain after 15 minutes walking.

Fig. 1b,1c: Following minimally invasive technique of an LINK® Endo-Model® Sled Prosthesis, post-operative x-rays show horizontal positioning of the Tibial Plateau in the coronal plane (Fig. 1b), a slight posterior slope of the plateau in the sagittal plane (Fig. 1c). RSA beads are issued in bone and implants. Two days after surgery, the patient was able to walk with crutches. His active ROM was 5 - 120°. At one week, he walked without crutches; at six weeks, he walked 5 km without any pain, and had ROM of 0 - 130°.



2a



2b

Female, age 62 years

Fig. 2a: Medial compartment OA, Ahlbäck Grade II, unable to walk without crutches, walking distance 500 m.

Fig. 2b: Following minimally invasive technique of a LINK® Endo-Model® Sled Prosthesis, good alignment and horizontal positioning of the Tibial Plateau was achieved. At four postoperative days, her ROM was 0 - 95°. By the end of the first month, the ROM was 0 - 115°.

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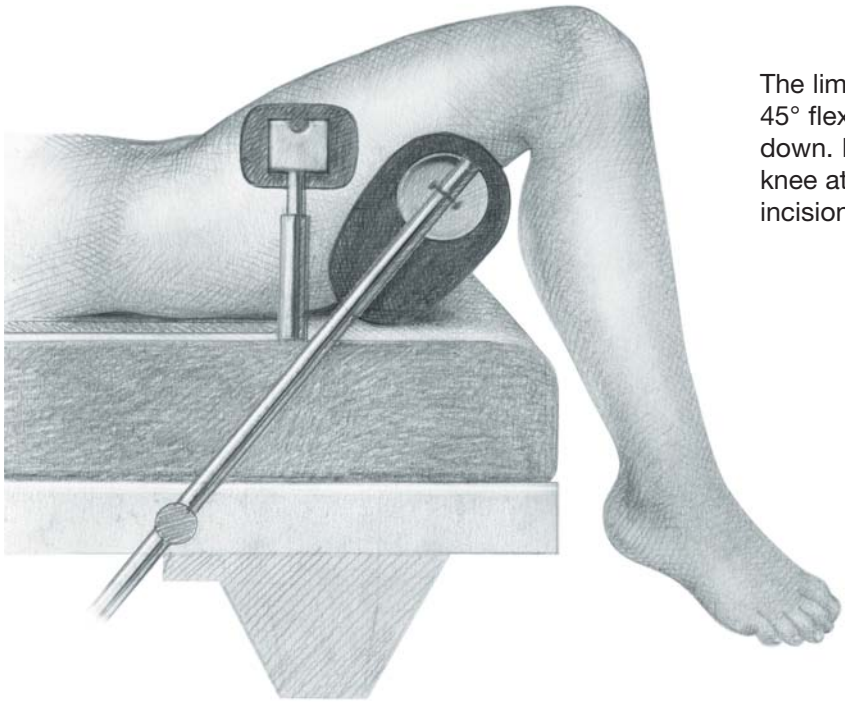
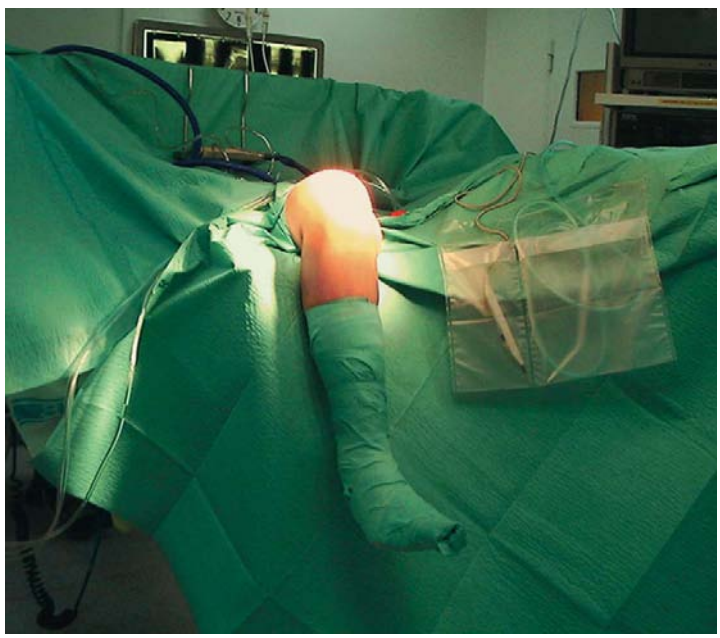
Surgical Technique

Patient Positioning

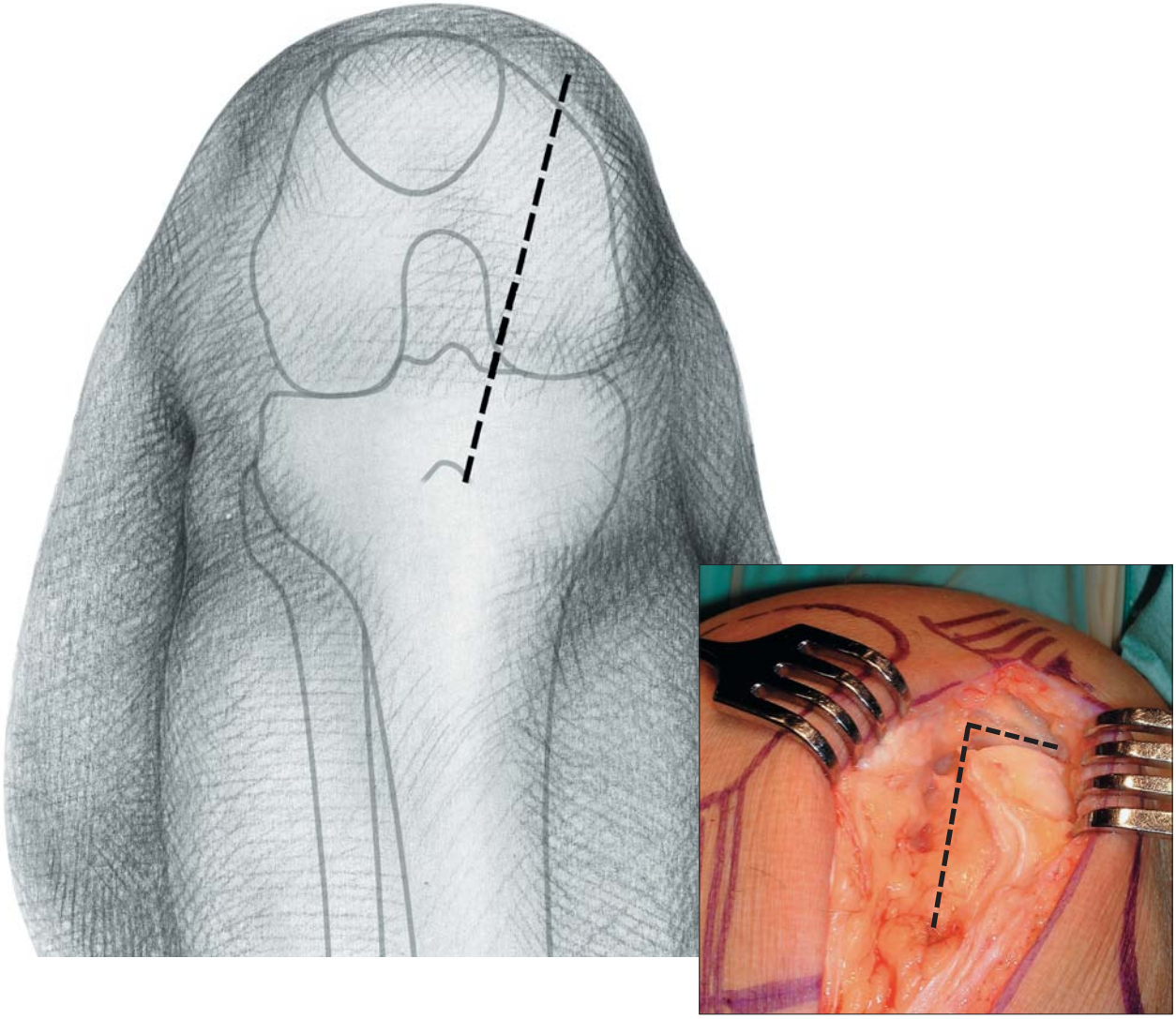


The limb is placed in a thigh support with 45° flexion of the hip. The leg is hanging down. It should be possible to flex the knee at least 120°. When using a medial incision a lateral thigh support is needed.



The operation is performed with the surgeon sitting in front of the flexed knee. The other leg is placed in a leg support leaving plenty of space for the surgeon and the assistant. The operation is performed in a bloodless field.

Approach



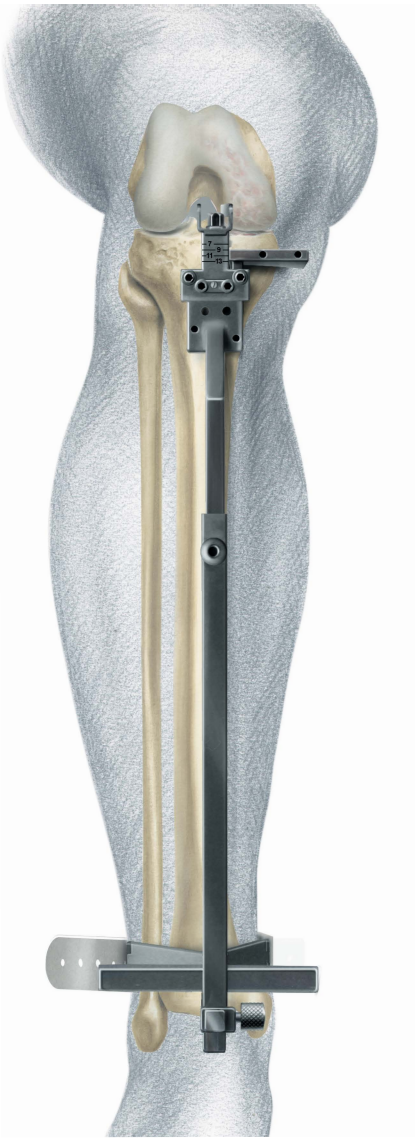
With the knee flexed 90°, a medial parapatellar incision is made starting at the margin of the vastus medialis 2-3 cm medial to the patella and extending distally and diagonally to the tibial tuber osity.

A medial parapatellar capsule incision is made. For better visualisation the incision is angulated in its proximal part. The vastus medialis is detached.
The capsule is released from the tibia almost to the front of the medial collateral ligament. The meniscus is removed. Partial excision of the retropatellar fat pad is necessary to gain better exposure of the intercondylar notch.

A retractor is placed in the lateral recess, allowing inspection of this compartment. To examine the patellar articulation, the knee is extended. If there are any doubts preoperatively about the condition of the other compartments diagnostic arthroscopy or MRI can be performed prior to the operation. After inspection, the retractor is placed in the intercondylar notch and the curved retractor behind the femoral condyle, to get a full view of the medial compartment.

Surgical Technique

Tibial Resection

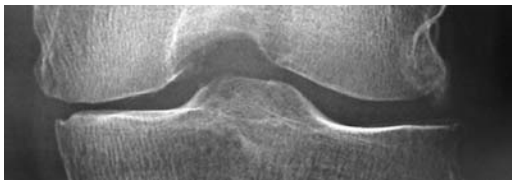


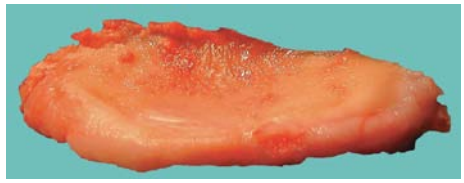
The purpose of the LINK® Endo-Model® Unicondylar Sled Prosthesis is to restore the damaged joint surfaces and the mechanical axis; a slight under-correction is desirable.

The **Tibial Saw Guide** allows the surgeon to determine and achieve the desired cutting depth precisely and to control the cutting in the frontal and the sagittal planes.
The Saw Guide can be used with either a minimally invasive technique or the traditional exposure.

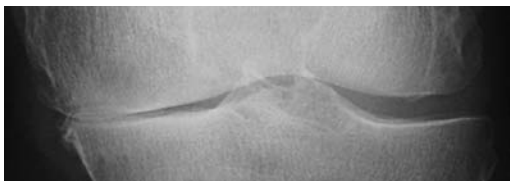
Tibial Resection

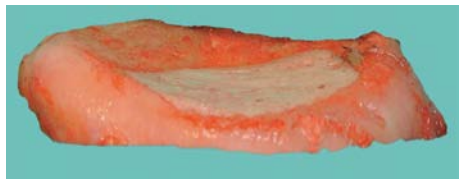
Grade I



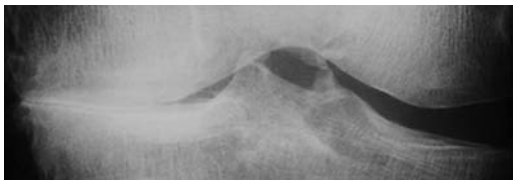


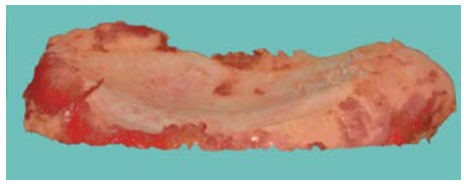
Grade II





Grade III





In knee replacement surgery by the traditional technique, the deepest point and the most damag ed area of the tibial plateau are taken as the basis for determining the depth of the tibial resection. The depth of the resection is then highly dependent on the sur geon's experience. Often further resection is needed or the height of the Tibial Plateau must be changed to obtain the desir ed alignment and stability of the knee. The best aid to determining the depth of the horizontal cut is weight-bearing radiographs of the knee and pr e-operative observations of the degree of cartilage damage. These allow a slight under correction of only a few degrees of varus to be achieved. The analysis of the weight-bearing radiographs is based on the classification of Ahlbäck.

The proposed resection depths are based on the use of a 9-mm high Tibial Plateau.

Grade I The joint space is reduced by one-half. The cartilage of the tibial condyle is pr eserved but reduced in height. The Cutting Platform should be adjusted to 11 mm depth. The stylus is placed at the deepest point of the remaining cartilage of the tibial condyle.

Grade II Total loss of the cartilage on both the femoral and the tibial condyles.The Cutting Platform should be adjusted to 9 mm depth and the stylus placed at the deepest point of the exposed bone of the tibial condyle.

Grade III Half a centimeter bone attrition of the femoral and tibial condyles on the fr ontal view weight-bearing radiograph. The Cutting Platform should be adjusted to 7 mm and the stylus placed at the bor der between the exposed and the er oded bone.

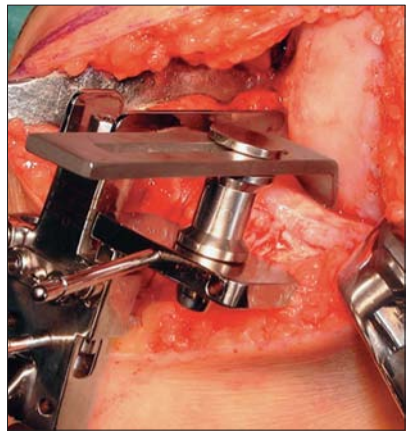
The stylus is not placed at the level of the planned surface of the Tibial Plateau. In Grade I the surface of the Tibial Plateau will be lower than the surface of the tibial condyle, and correspondingly in Grade III the surface of the Tibial Plateau will be higher than the surface of the damaged tibial condyle.

Surgical Technique

Tibial Resection

Height of Tibial Component	Resection Depth: Grade I	Grade II	Grade III
7 mm	9	7	-
9 mm	11	9	7
11 mm	13	11	9

Table 1
Depth of the tibial resection (mm) in relation to the chosen height of the Tibial Plateau.



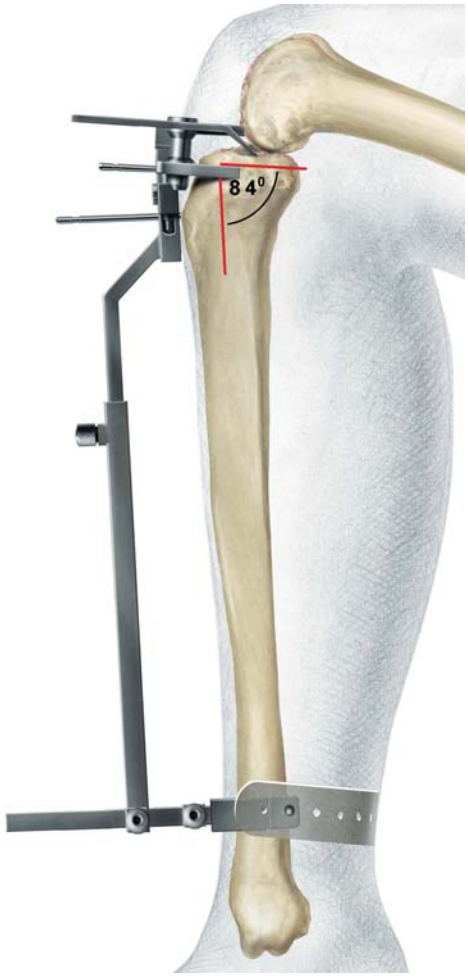
Resection Depth	Height of Tibial Component: Grade I	Grade II	Grade III
7 mm	-	7	9
9 mm	7	9	11
11 mm	9	11	13

Table 2:
Height of the Tibial Plateau (mm) in relation to the depth of the tibial cutting.

Table 1
When a 7-mm high Tibial Plateau is used, the tibial resection depth should be 9 mm in Grade I knees and 7 mm in Grade II knees. Since the St.George® polyethylene Tibial Plateau is not available in a 7-mm height, an Endo-Model® metal-backed Tibial Plateau must be used. Because the construction of the Tibial Saw Guide does not permit less than 7 mm resection depth between the tip of the stylus and the Cutting Platform a 7-mm Tibial Plateau cannot be used in Grade III osteoarthrosis, and such knees must therefore be undercorrected. According to suggestions given above, the depth of the resection when using an 11-mm Tibial Plateau will be 13 mm in Grade I, 11 mm in Grade II, and 9 mm in Grade III. These resection depths will unnecessarily be too deep and will remove more bone than necessary.

Table 2
It is convenient to use the same resection depth independent of the degree of cartilage and bone damage. This means that a resection depth of 9 mm in relation to the tibial surface is needed in order to use a 7-mm Tibial Plateau in Grade I, a 9-mm Tibial Plateau in Grade II and an 11-mm Tibial Plateau in Grade III to achieve the same degree of alignment.

Tibial Resection



The clamp of the Tibial Saw Guide is placed at the level of the ankle directly proximal to the malleoli.

The posterior slope of the Tibial Component

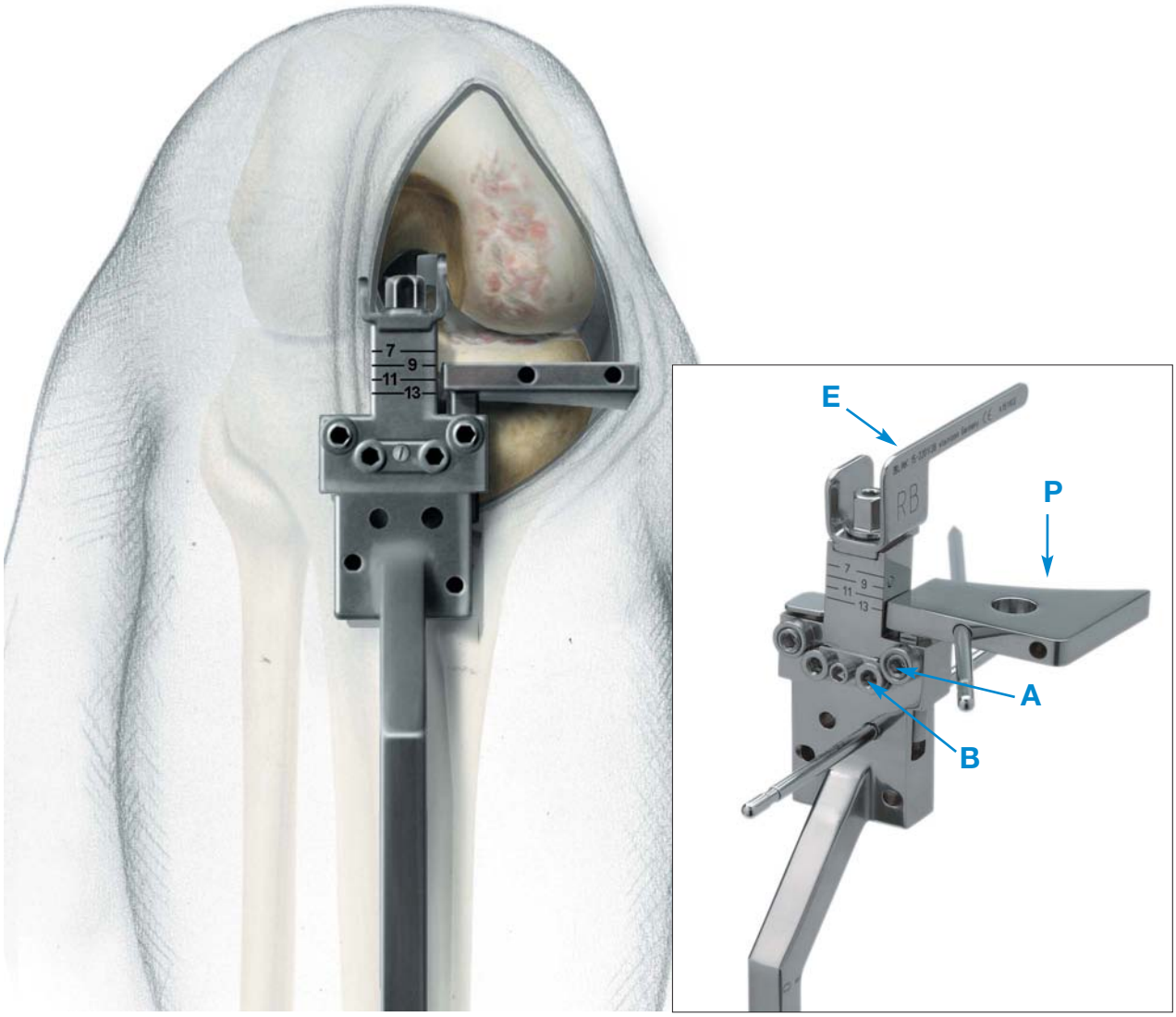
Note that the Cutting Platform has a posterior slope of 6° in relation to the long axis of the Guide. The Tibial Saw Guide should be adjusted in the vertical plane parallel to the long axis of tibia by moving the vertical rod ventrally. In most cases the Guide needs to be moved 20-25 mm anteriorly to obtain the required posterior angle of a 6°. **Lock Screw A.**

The horizontal slope of the Tibial Component

The horizontal slope of the Tibial Component can be adjusted by placing the distal fixation of the long rod beneath the actual tibia condyle. In women the rod is moved approximately 20-25 mm and in men 25-30 mm from the centre to achieve a cutting surface perpendicular to the long axis of tibia. The horizontal slope is controlled with the Alignment Rod. **Lock Screw B.**

Surgical Technique

Tibial Resection

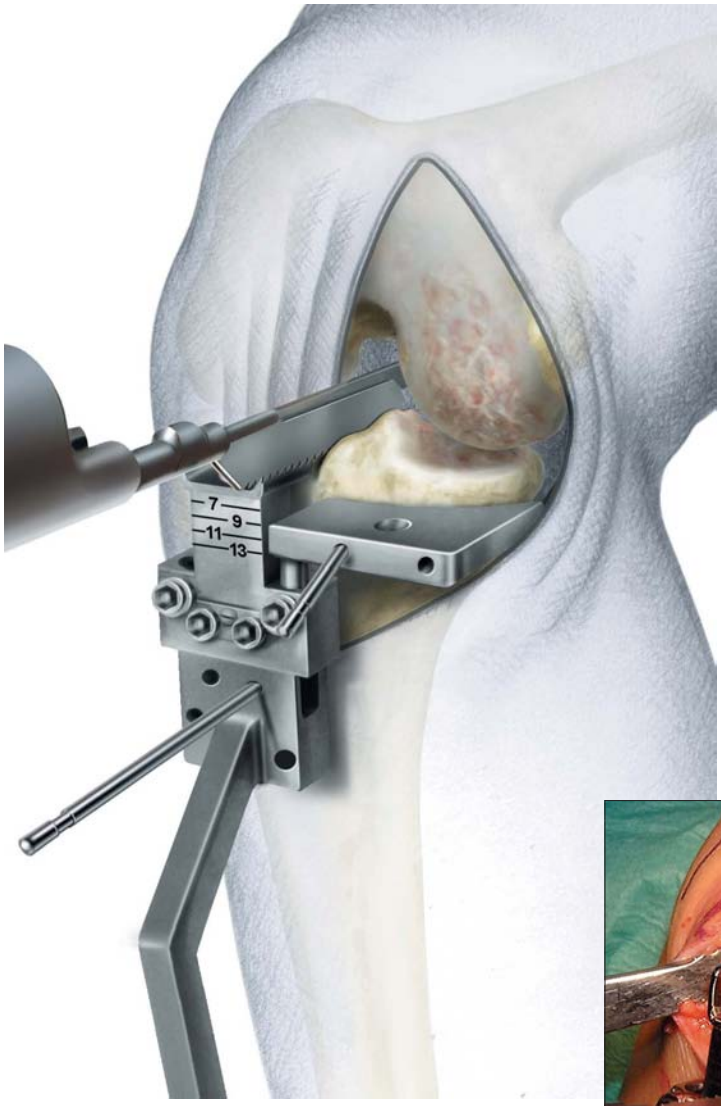


The **Eminentia Saw Guide (E)** is placed close and parallel to the eminentia along the planned sagittal cut.

There are **Cutting Platforms (P)** for the medial as well as the lateral compartments. The cutting depth can be set between 7 and 13 mm by using a Scr ewdriver in the adjustment **Hole (B)**. The Cutting Platform is secured and locked with **Screw (A)**.

The **Tibial Saw Guide** is fixed with a Fixation Pin in the central hole of the platform. The Pin is angulated centrally towards the eminentia. A second Fixation Pin is placed in the Tibial Saw Guide to secur e the position.

Tibial Resection

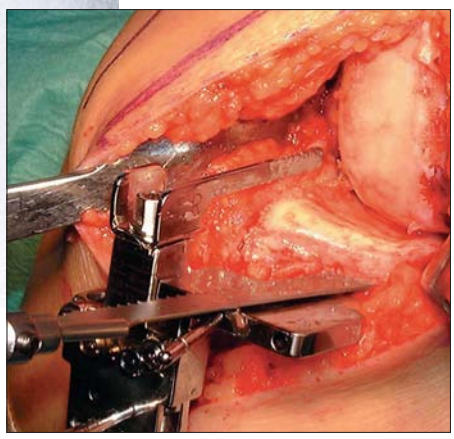


Bone Cuts

The **vertical cut** is performed along the Eminentia Saw Guide.

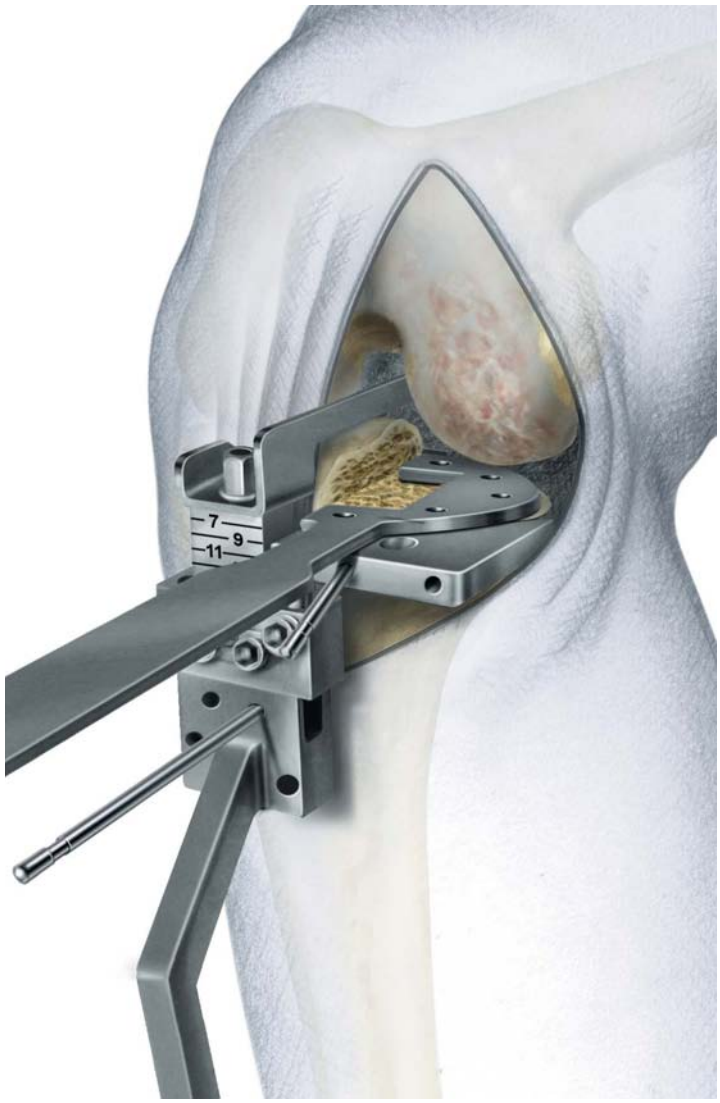
The **horizontal cut** is guided by the Cutting Platform.

The resected Tibial Plateau and remaining parts of the meniscus are then removed.



Surgical Technique

Tibial Resection



Templates for Tibial Plateaus St. Georg®
(3 sizes: 45, 50, 55 mm)

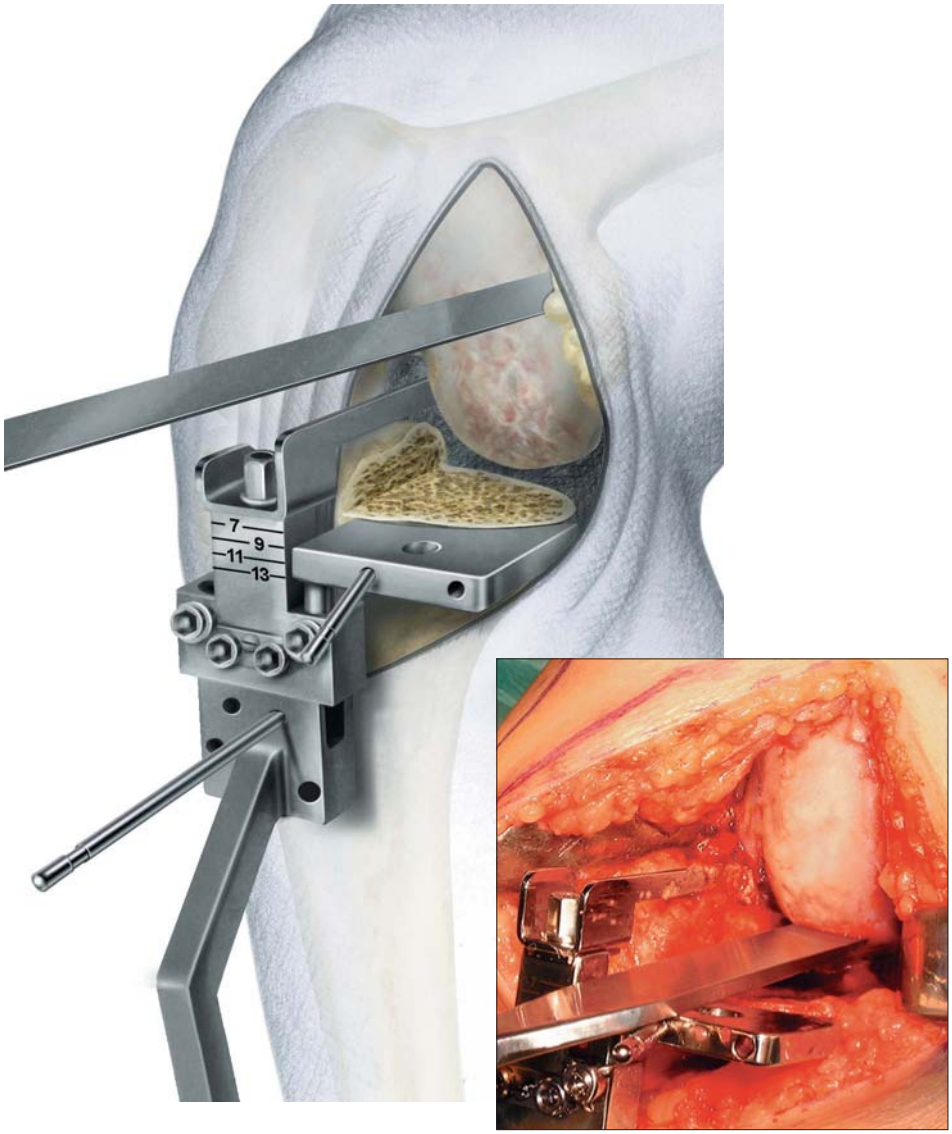
Templates for Tibial Plateaus Endo-Model®
(3 sizes: 45, 50, 55 mm)

Depending on implant selection either a St. Georg® or a Endo-Model® **Template** is used for the sizing of the Tibial Plateau. Both are available in three sizes (45, 50 and 55 mm).

The size of the Tibial Plateau in the sagittal plane is determined by placing the hook of the T emplate behind the tibial condyle. If the anterior part of the T emplate is in alignment with the anterior bor der of the tibia, that is the right size.

The size must be checked medially to ensur e there is no medial overhang.

Femur Resection



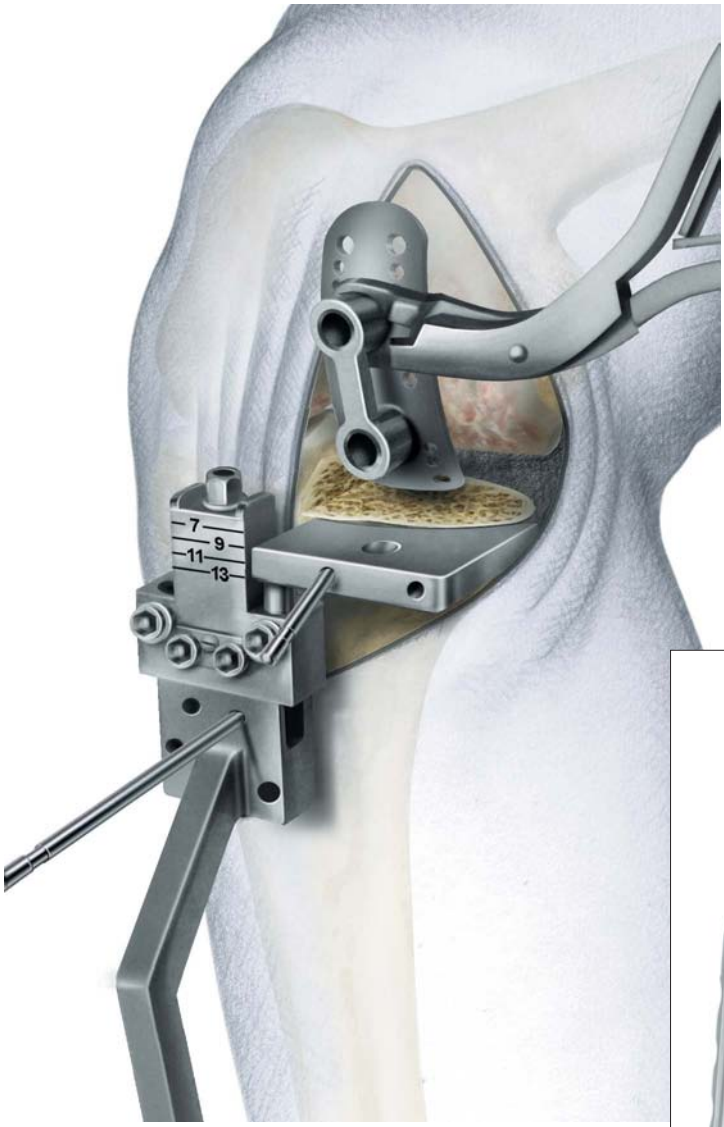
Do not remove the Tibial Saw Guide during the preparation for the Femoral Component.

Begin the preparation of the femoral condyle by cutting 3-5 mm of its posterior aspect to r emove undamaged cartilage.

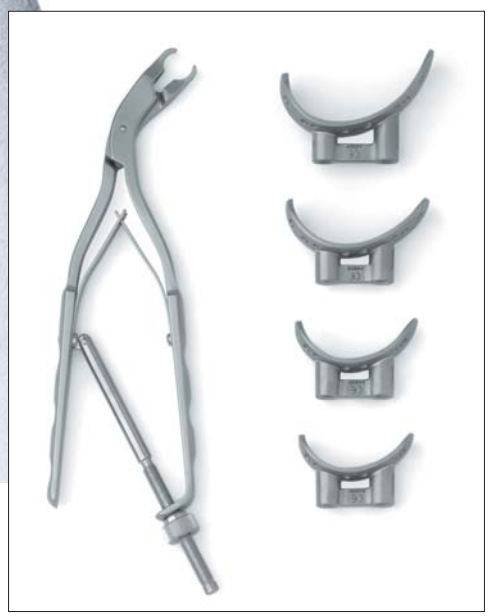
Resect central and medial osteophytes, with attention to osteophytes behind the medial collateral ligament.

Surgical Technique

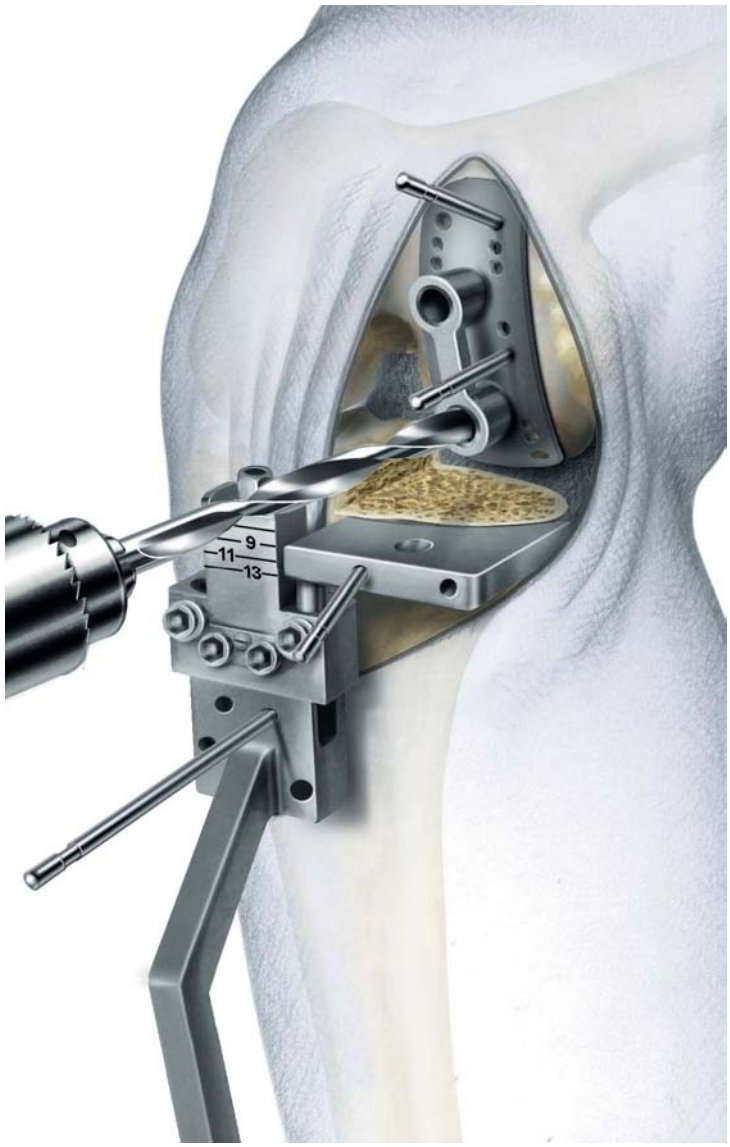
Femur Resection



There are four sizes of the Femoral Components (40, 46, 52 and 60 mm) and corresponding **Drill Guides** to determine the correct size. The selected femoral Drill Guide is placed centrally on the femoral condyle and fixed with two short Fixation Pins.



Femur Resection

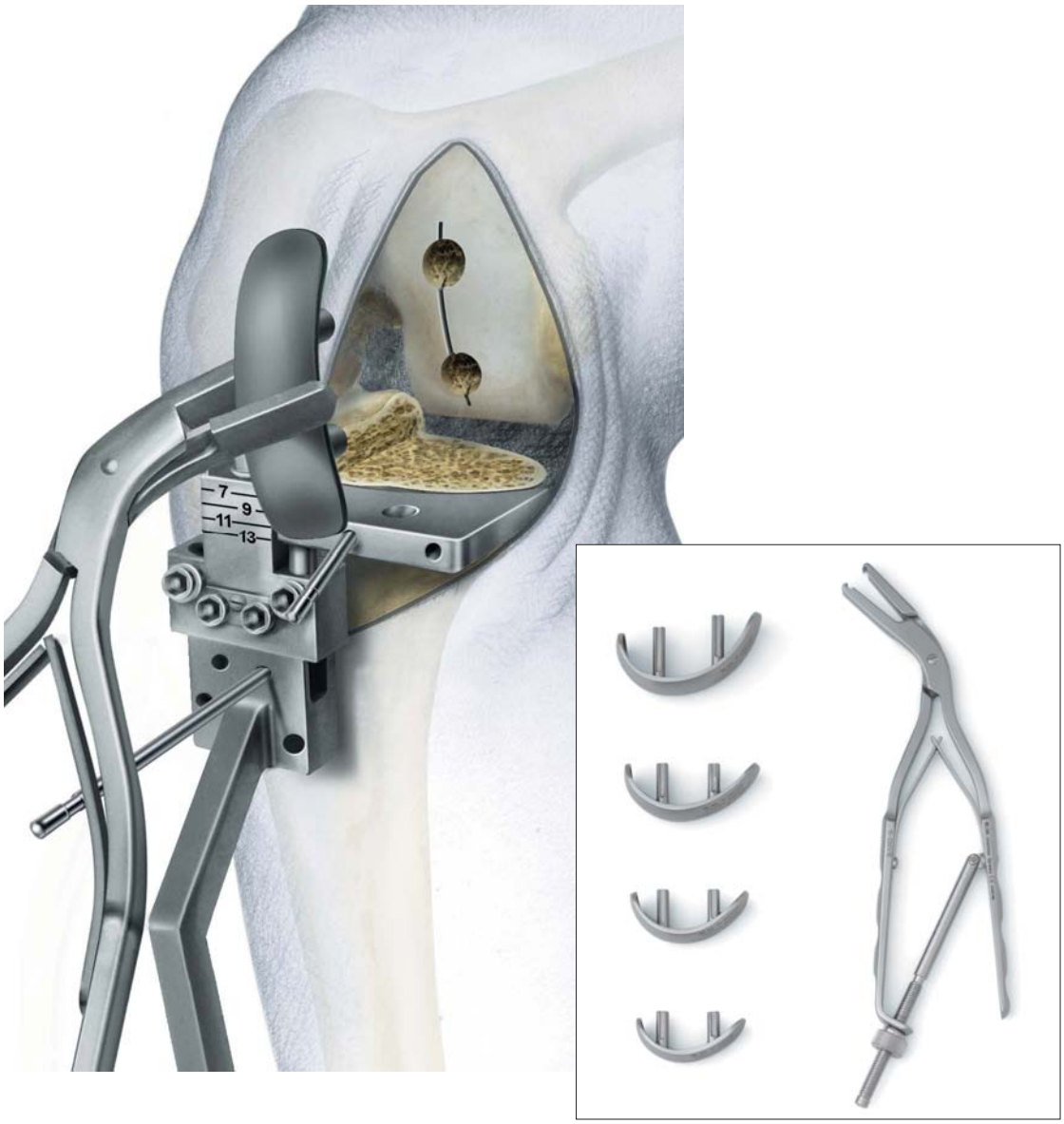


Drill the anchoring holes. If it is difficult to drill the lower hole at 100-110° of flexion of the knee, the Femoral Drill Guide is either too large or has been placed too far dorsally. Either change its position or chose a smaller Drill Guide.

Mark the borders of the Drill Guide. Remove any cartilage inside the area marked for the Femoral Component.

Surgical Technique

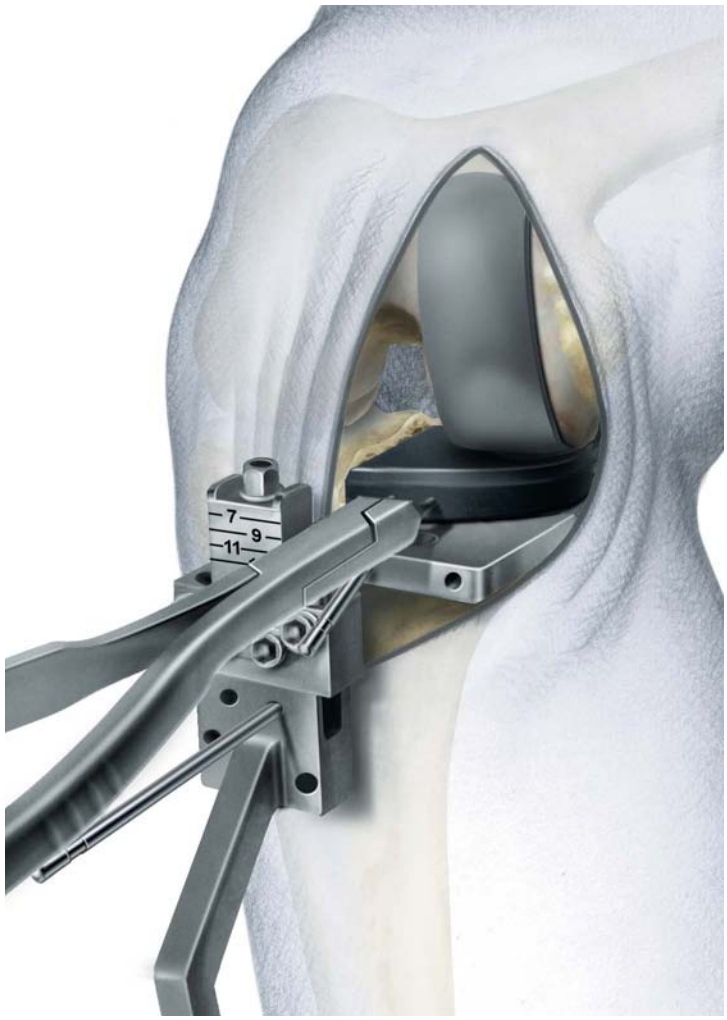
Trial Reduction



Corresponding to the Femoral Drill Guides are four **Femoral Trial Sled Prostheses**. Before trialing the chosen size, use a chisel or a saw to prepare a groove between the two anchoring holes. Place the Femoral Trial Sled Prosthesis using the **Inserting Forceps**.

Test knee flexion and extension to make certain that the Femoral Trial Sled Prosthesis does not make contact with the patella at any point during the movement. If it does, remove that part of the patella that made the contact.

Trial Reduction



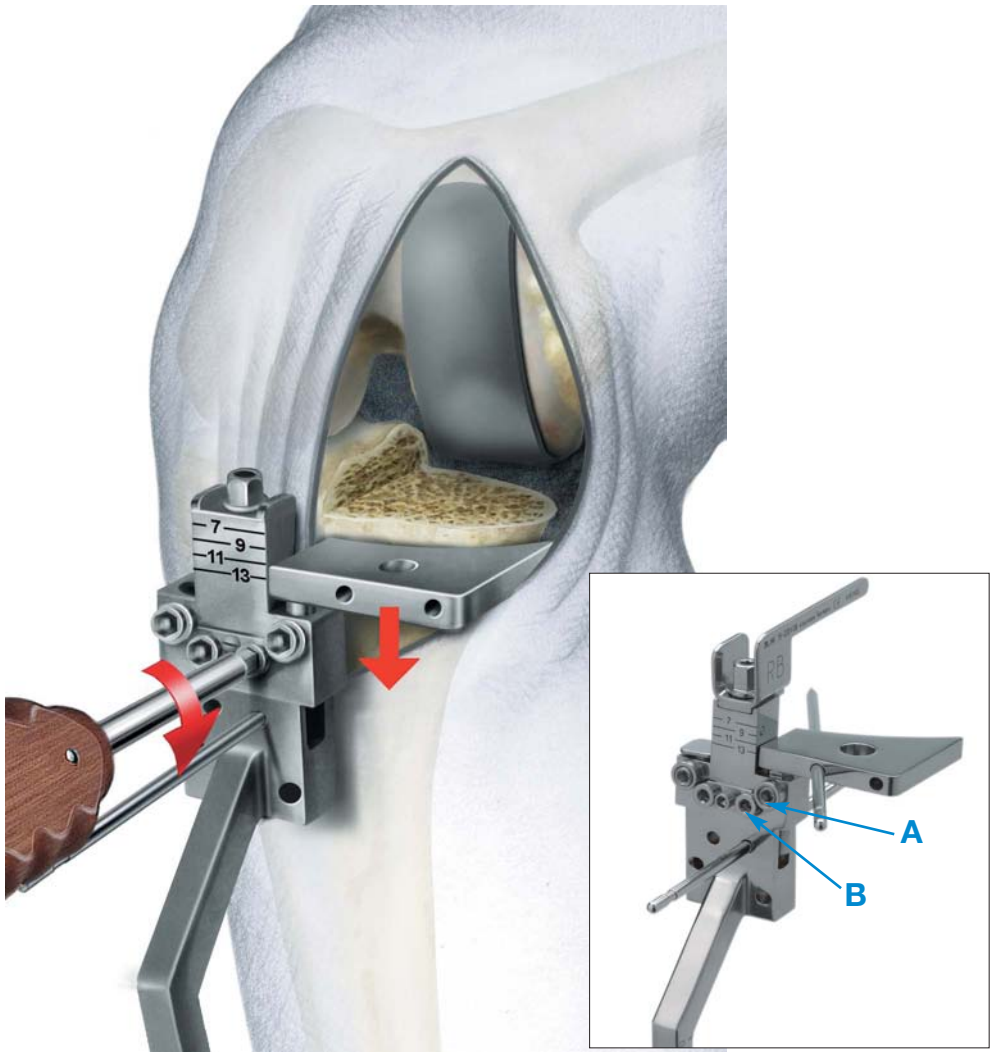
The St. Georg® **Tibial Plateaus** (polyethylene) are available in 3 heights (9, 11 and 13 mm) and the Endo-Model® (metal backed) in 4 heights (7, 9, 11 and 13 mm).

With the Femoral Trial Sled Prosthesis in place, a 9-mm **Tibial Trial Plateau** is positioned. This is easiest when the knee is flexed at least 90°. Some valgus load may be needed. If the Tibial Component has a tendency to tilt anteriorly, the posterior angle of slope is too small.
This can be corrected with a rasp.

Extend the knee to test the stability. In a normal knee there should be only a few millimeters' space between the components under valgus stress in a neutral position. If the gap is too wide change to a higher Tibial Component. In genu recurvatum, the gap is wider in the neutral position a nd the knee is stable only in hyperextension. Try to obtain the same degree of hyperextension of the knee as was pr esent preoperatively, otherwise there is a risk that the knee will be over corrected in valgus.

Surgical Technique

Trial Reduction

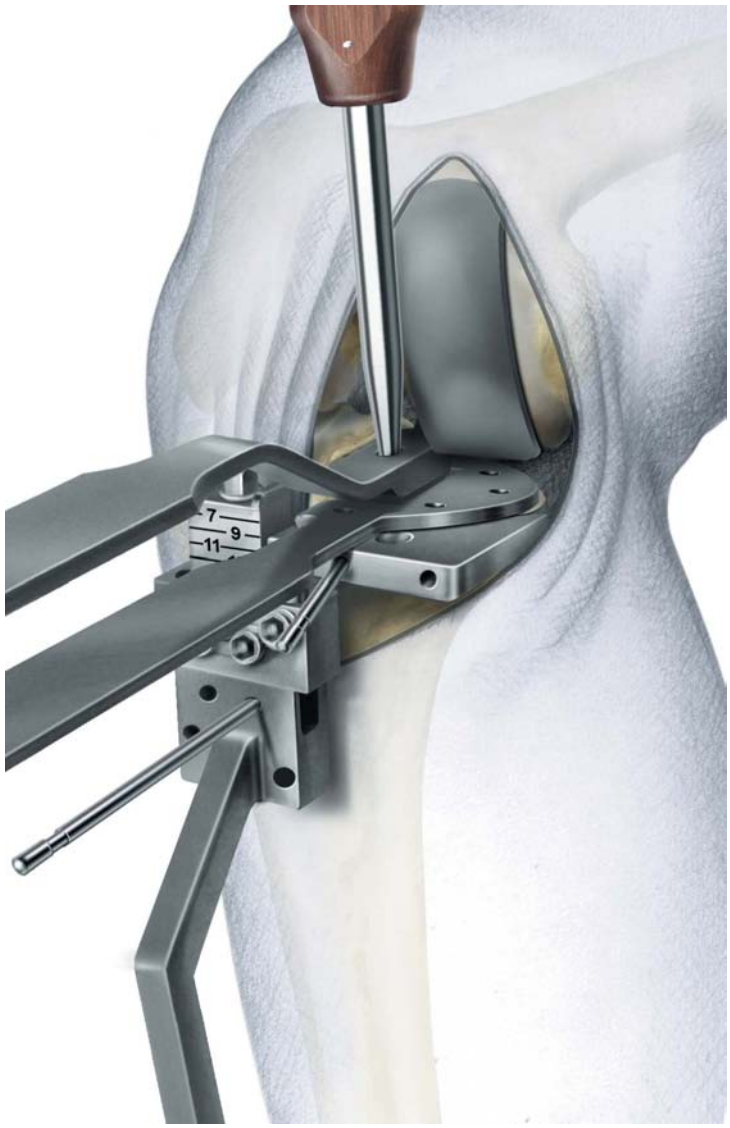


If the knee is too tight, remove the Tibial Trial Component and the Fixation Pin in the Cutting Platform and loosen **Screw (A)**. Deepen the resection by lowering the platform to the appropriate level by turning **Screw (B)** using a Screwdriver. As a rule 1-mm increase in resection depth increases varus angulation by 2 degrees.

Secure the Cutting Platform by tightening **Screw (A)** and stabilize it with a Fixation Pin through one of the unused holes in the Cutting Platform.

Perform the cut and repeat the trial by using the same height of the Tibial Trial Component.

Cementation



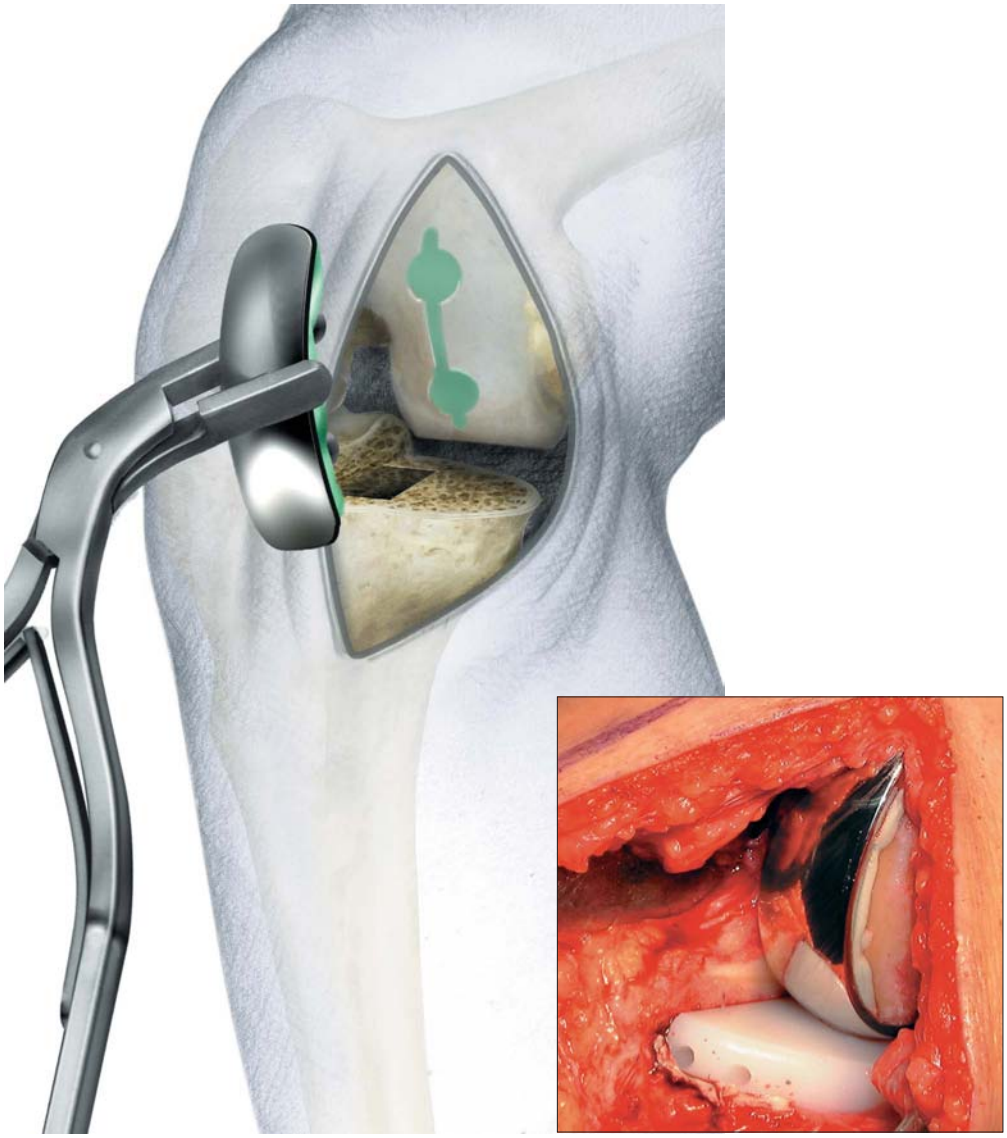
Prepare the space for the keel of the Endo-Model® Tibial Plateau (metal backed), place the head of the **Cancellous Bone Compressor** into the recess of the tibial Template and impact it using the **Impactor**.

The keel of the St. Georg® Tibial Plateau (polyethylene) is larger. To prevent fractures of the tibial condyle remove some bone with a chisel before impacting the Bone Compressor.

Whichever Tibial Plateau is being used, the tibial surface needs to be protected during the compression of the bone with the tibial Template, which is laid on the sawing platform. Test that the final choice of Tibial Plateau fits and can be placed easily. Some valgus stress will be needed. The keel slot may be extended anteriorly if necessary.

Surgical Technique

Cementation



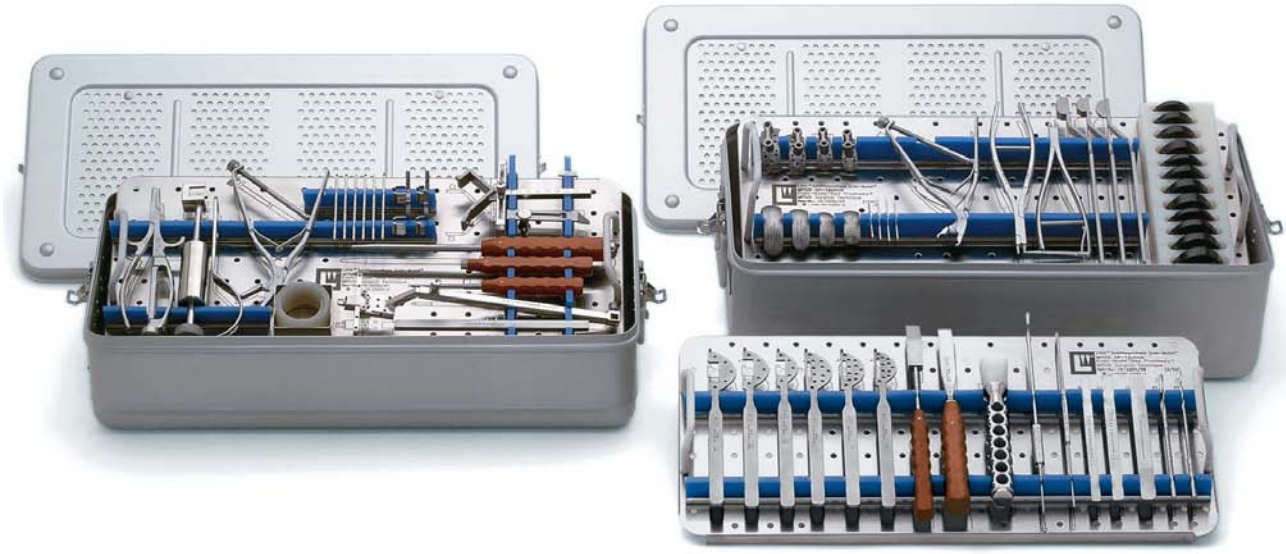
Before cementing the prosthesis remove the Tibial Saw Guide.

Prior to cementing inject 40 ml of 0.25 % Mar cain® (Bupivacain) into the capsule to minimize postoperative pain and to facilitate the mobilization of the patient. Using an appr opriate cementing technique, cement the Femoral Prosthesis first. Remove excess cement with the cur ette.

Extend the knee to a neutral position and allow the cement to harden. Remove any remaining excess cement.

Release the tourniquet and carry out careful hemostasis. The capsule and skin are sutured with the knee flexed at 90°.

MITUS® Instrument Set, complete
for Minimally Invasive OP Technique of LINK® Unicondylar Sled Prosthesis
Endo-Model®



Art.-Nr. / Item No.	**Instrument Set complete (Container 1 + 2)**
15-2200	**Set complete** in 2 Standard Containers N11 & N21, on 3 trays with product illustrations and storage inserts
05-2001/03	**N11 Standard Container,** empty 575 x 275 x 100 mm
05-2002/03	**N21 Standard Container,** empty 575 x 275 x 130 mm
15-2200/02	**Lower Tray** (Container 1), empty perforated stainless steel 550 x 265 x 50 mm
15-2200/03	**Upper Tray** (Container 1), empty perforated stainless steel 550 x 265 x 50 mm
15-2200/01	**Tray** (Container 2), empty perforated stainless steel 550 x 265 x 50 mm

X-rays / Information

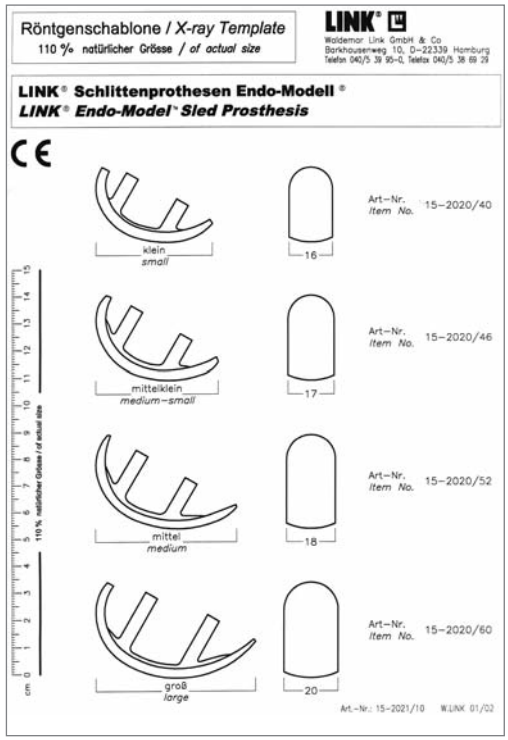
X-rays

X-rays, 110% actual size, 1 sheet

15-2021/10 for Endo-Model® Sled Prostheses
15-2020/40 to 15-2020/60

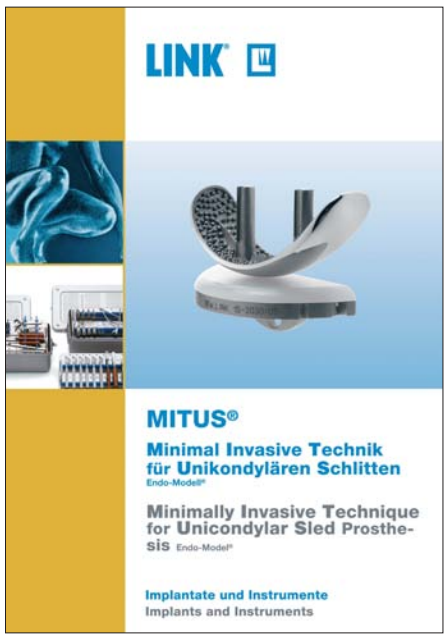
15-2021/11 for Endo-Model® Tibial Plateaus (metal-backed)
15-2030/01 to 15-2030/12

15-2021/12 for St. Georg® Tibial Plateaus (non metal-backed)
15-2028/03 to 15-2028/12

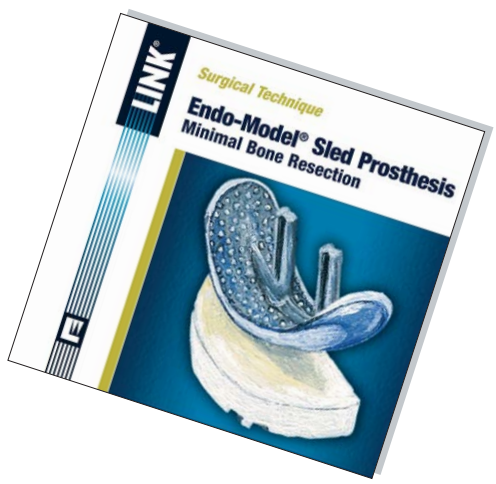


Information

Available on request



Catalog MITUS® Implants & Instruments
Order Nr. 739 dt-en/Impl.



CD MITUS® Surgical Technique

Important Information

Please note the following regarding the use of our implants:

1. **Choosing the right implant is extremely important.**
   The size and shape of the human bone determine the size and shape of the implant. Load capacity is therefore also limited. Implants are not designed to withstand unlimited physical stress. Demands should not exceed normal functional loads.

2. **Correct handling of the implant is exceedingly important.**
   Altering the shape of a finished implant shortens its life span. Under no circumstances should the implant be bent sharply, snapped off, bent back, grooved or scratched. Our implants may not be combined with implants from other manufacturers.

   The instruments indicated in the Surgical Technique must be used to ensure safe implantation of the components.

3. **Implants must not be reused.**
   Even if a used implant looks undamaged, it must be assumed that the material has become internally fatigued.

4. **After-treatment is also very important.**
   The patient must be informed of the limitations of the implant. The load capacity of an implant cannot compare with that of healthy bone!

5. **Unless otherwise indicated, implants are supplied in sterile packaging.**
   Note the following conditions for storage of packaged implants:

- Avoid extreme or sudden changes in temperature.
- We recommend a storage temperature of 18–22°C at 50–65% humidity.
- Avoid direct sunlight.
- Protect implants from damp, moisture and mechanical damage.
- Implants may be stored in their original packaging for up to 5 years after the date of manufacture.
  The “Use by” date is indicated on the product label.
- Do not use an implant if the packaging is damaged.

6. **Traceability is important.**
   Please use the documentation stickers provided to ensure traceability.

7. **Further information** on the material composition is available on request from the manufacturer.

   Follow the instructions for use!

WALDEMAR LINK GmbH & Co. KG, Hamburg.

The Surgical Technique described has been written to the best of our knowledge and belief but it does not relieve the surgeon of his responsibility to duly consider the particularities of each individual case.

Unless otherwise indicated, all instruments are made of stainless steel.

LINK®

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