# Vanguard® ID Total Knee

## Surgical Technique

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# Overview

## The Vanguard ID Surgical Technique consists of:

- **Vanguard XP® Femoral Component**
- **One tibial tray: XP-CR Interlok® Tibial Tray**
- **Two bearing designs: XP-XP and XP-AS**

The components can be used in different combinations, depending on the patient's soft tissue status (see table below).

## Level of Constraint Options

| | Intact, Functioning PCL | | Intact, Partially Functioning PCL | |
|---|---|---|---|---|
| **Femoral Component** | XP Femoral | | XP Femoral | |
| **Tibial Component** | XP-CR (ID) Tibia | | XP-CR (ID) Tibia | |
| **Bearing Combinations** *(maximum 2 mm thickness difference)* | **Medial Plateau** | **Lateral Plateau** | **Medial Plateau** | **Lateral Plateau** |
| | XP-XP Medial | XP-XP Lateral | XP-AS | XP-AS |
| | XP-XP Medial | XP-XP Medial | XP-XP Medial | XP-AS |
| | XP-XP Medial | XP-AS | XP-AS | XP-XP Medial |
| | XP-AS | XP-XP Medial | XP-AS | XP-XP Lateral |
| | XP-AS | XP-XP Lateral | | |

Warning: Only use the above combinations. The use of XP-XP Lateral Bearings on the medial side has not been evaluated and could lead to premature failure of the device.

If additional implant constraint is desired, the Vanguard® PS or PS+ System can be utilized.

**Note:**

- **Femoral Pegs:** The Vanguard XP Femoral Component has two modular distal pegs. To help address minor bone deficiencies, the pegs can be removed and distal femoral augments attached using an augment bolt or an augment peg.
- **Femoral Augments:** The use of femoral augments does not necessarily change the recommended implant combinations (table above) – the appropriate implant combination should be chosen based on the intact soft tissues.

## Description

Zimmer Biomet manufactures a variety of knee joint replacement prostheses intended for application with or without bone cement. Knee joint replacement components include: femoral, tibial, and patellar components. Components are available in a variety of designs and size ranges intended for both primary and revision applications. Specialty components are available including: femoral stems, femoral screws, femoral augments, tibial stems, tibial screws, tibial augments, tibial cement plugs, and modular pegs.

- The Vanguard ID Total Knee is designed to offer the flexibility to individually treat the medial and lateral compartments to match the patient's soft tissue envelope.
- The transition between each constraint level can be made with ease, allowing the physician to evaluate soft tissue and bone deficiencies intraoperatively without making a preoperative commitment to the level of constraint.

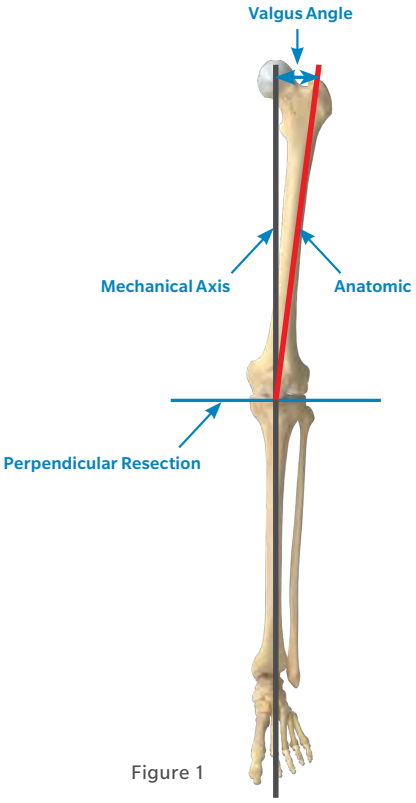



Figure 1

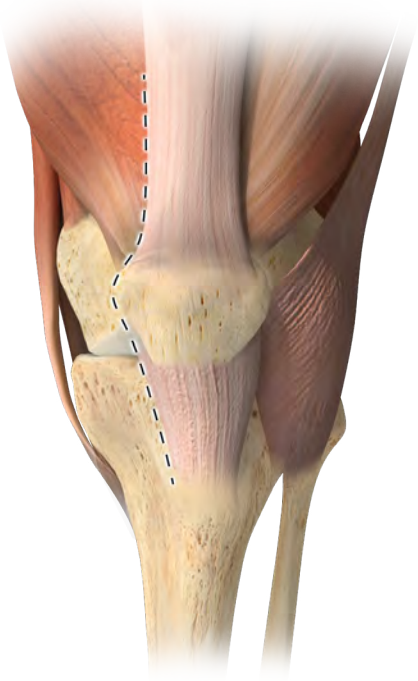


Figure 2

## Preoperative Planning

Assess bone stock and potential ligament instability and the anatomical axis with 36 inch long standing A/P X-rays.

Measure valgus angle (angle between anatomic and mechanical axis) to assure the distal femoral cut is perpendicular to the mechanical axis (Figure 1).

Estimate femoral component size using lateral view X-ray.

**Note:** Confirmation of the appropriate size component intraoperatively is critical for normal kinematics.

## Incision

The Vanguard ID Knee utilizes the Vanguard XP Total Knee Instrumentation, which is also designed for standard surgical approaches (Figure 2).

Ensure that the patella tendon tibia interface is released so the patella can easily sit in the lateral gutter of the knee. Take care to not release medial collateral ligament (MCL) during initial exposure.

**Note:** If multiple scars from previous surgeries exist, evaluate skin incision placement and elements of scarring, which may decrease soft tissue mobility.

## Patella Preparation

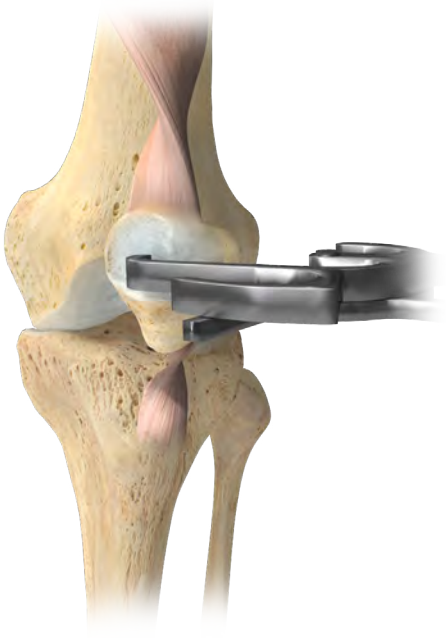


Figure 3

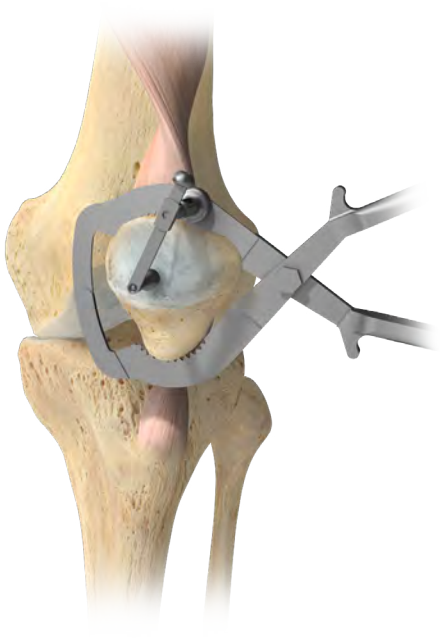


Figure 4

## Patella Resection

**Vanguard ID Tip:** Preparation of the patella at this time frees up the joint capsule and facilitates exposure for the remainder of the case.

### Option 1: Surface Clamp

Tilt the patella for patella preparation.

Remove the osteophytes and peripatellar tissues down to the level of the quadriceps and patellar tendon insertion.

Determine the patella thickness and resection amount by using the patella caliper (Figure 3).

The patella saw guide stylus can be utilized to determine the appropriate resection level (Figure 4).

Use the patella clamp surface cut guide to perform the initial, flat patellar resection.

**Note:** Care should be taken to restore original patella thickness to prevent overstuffing or under tensioning of the patellofemoral joint.

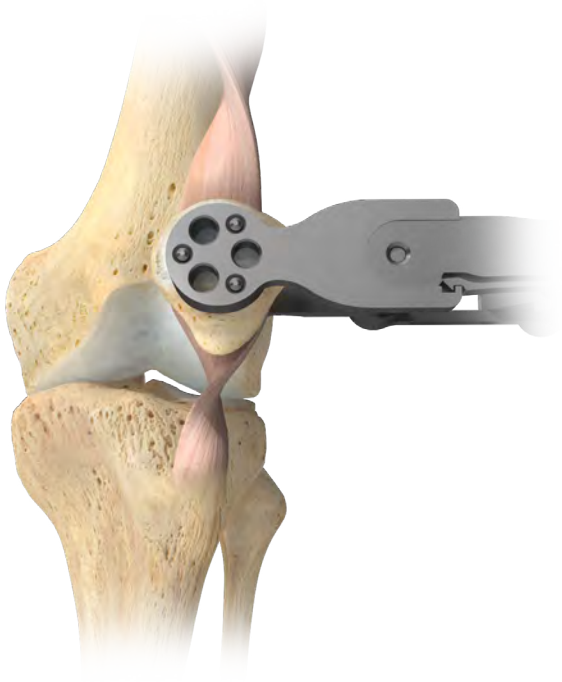


Figure 5

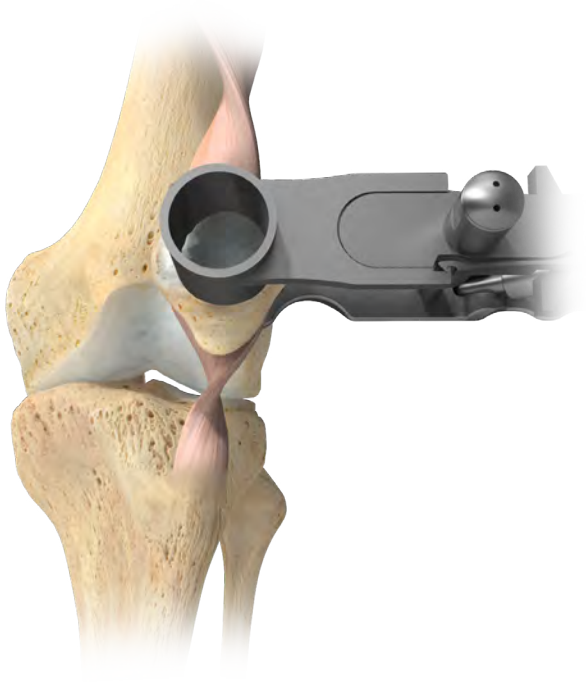


Figure 6

## Patella Resection (cont.)

**Option 1: Surface Clamp** (cont.)

1-peg patellar component:

- Use the 1-peg patellar drill guide to locate the placement of the central peg.
- Drill the central hole using the 5/16 inch Series A™ Patellar Drill.
- Select a trial patellar component to optimize coverage without increasing patellar thickness beyond pre-resection height.

3-peg patellar component:

- Place the appropriately sized 3-peg drill guide onto the resected patella and use the ¼ inch patellar drill to prepare for the component pegs (Figure 5).

**Option 2: Patella Milling**

Tilt the patella for patella preparation.

Remove the osteophytes and peripatellar tissues down to the level of the quadriceps and patellar tendon insertion.

Determine the patella thickness and resection amount by using the patella caliper.

Size the patella using the mill bushings (Figure 6).

Attach the size-specific bushing to the mill handle.

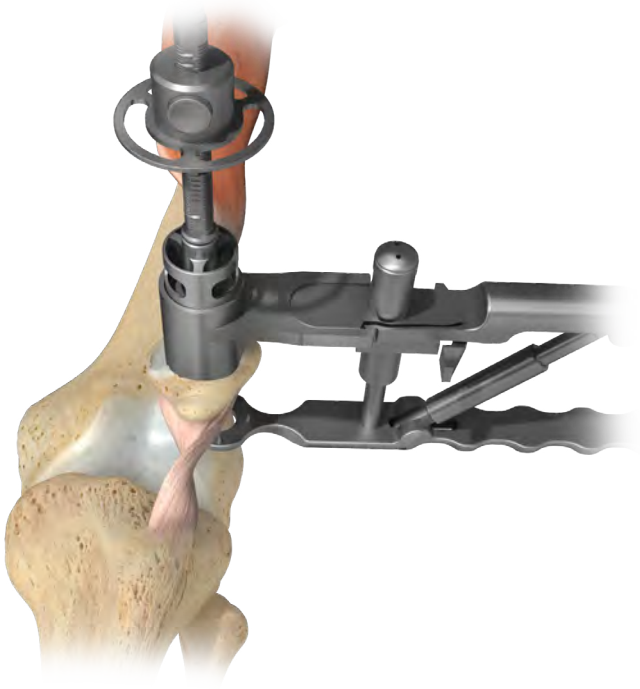


Figure 7

## Patella Resection (cont.)

**Option 2: Patella Milling** (cont.)

**Note:** The patella size and thickness will determine if a standard or thin patella should be used.

Firmly clamp the patella with the mill handle paying careful attention not to tilt the patella.

Attach the appropriate size-specific 3-peg or 1-peg patella reamer to the reamer shaft (Figure 7).

Attach the proximal shaft to a power drill.

Insert the reamer basket into the mill bushing and allow the reamer's central bit to rest on the apex of the patella bone.

Attach the appropriate thickness magnetic spacer (marked, "Bit") to the adjustable depth stop.

Set the adjustable stop by depressing the button on its side and slide the stop down until the bottom of the spacer touches the mill bushing.

**Note:** The magnetic spacer bit includes the depth of the peg. Do not sink the drill bit prior to setting the adjustable stop.

Remove the magnetic spacer and ream until the adjustable stop touches the mill bushing.

Remove the reamer assembly. Then, disengage the mill handle by pulling the thumb trigger towards the handle.

3-peg patellar component:

- Prepare the inset surface using the appropriate sized surface reamer.
- Establish the resection depth using the magnetic spacer marked with a red dot.
- The 3-peg drill guide is tapped into the prepared patella inset and the ¼ inch patellar drill is used to make the holes for the component pegs.

## Femoral Preparation

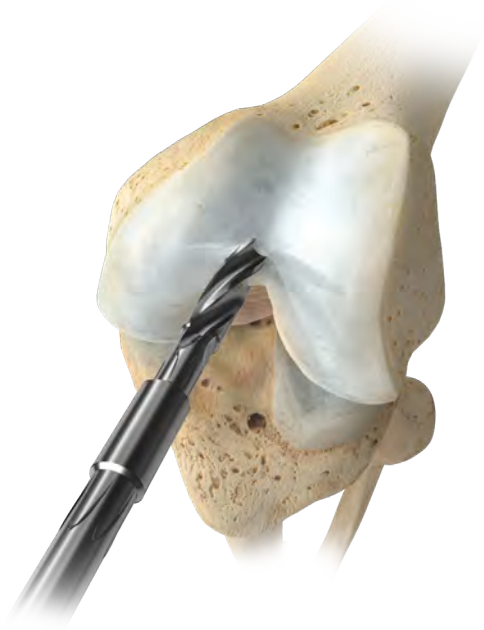


Figure 8

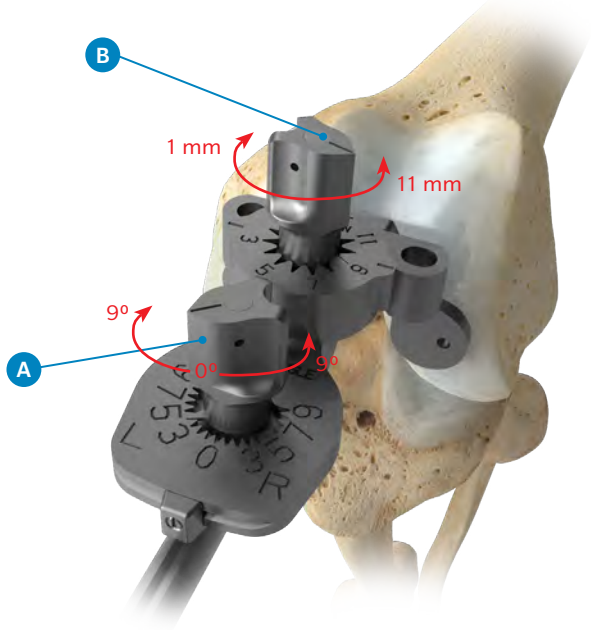



Figure 9

## Distal Femoral Resection

Utilize the .375 inch intramedullary (IM) drill to penetrate the intercondylar notch of the distal femur to a depth of approximately 1.5–2 inch (3.5–5 cm) (Figure 8).

Place the canal entry location 1 cm above the insertion of the posterior cruciate ligament (PCL) and slightly medial in the intercondylar notch.

**Note:** Irrigation and suction of the femoral canal can be performed to decrease canal contents.

### Option 1: Adjustable Distal Femoral Resection Guide

Set the adjustable distal cut guide to the desired valgus angle by pressing and turning the valgus angle dial (Figure 9A).

Select the depth of distal resection by turning the resection level dial (Figure 9B).

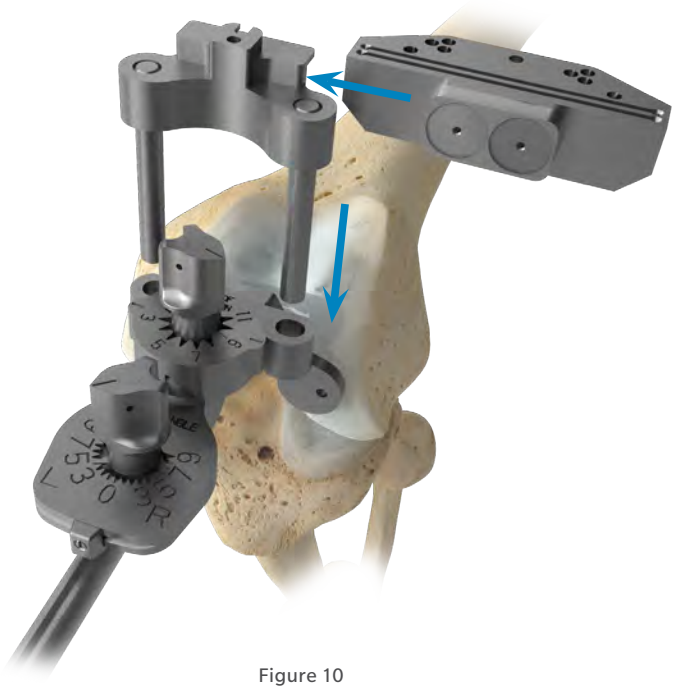


Figure 10

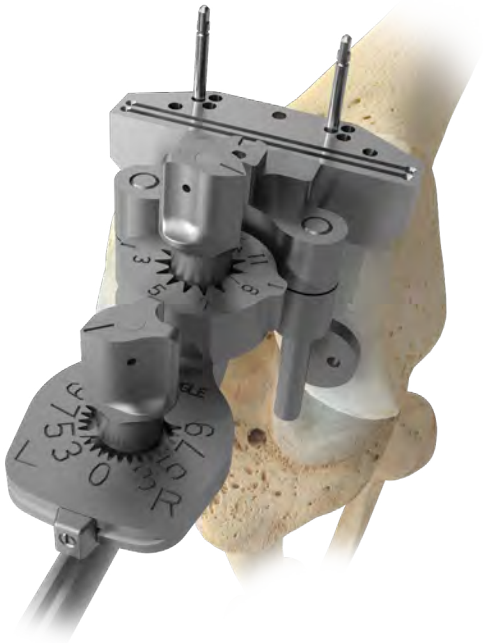


Figure 11

## Distal Femoral Resection (cont.)

**Option 1: Adjustable Distal Femoral Resection Guide** (cont.)

Assemble the IM rod and adjustable distal cut guide by inserting the IM rod through the central hole of the adjustable distal cut guide.

Slowly introduce the IM rod to the femoral canal to depressurize the canal.

Slide the adjustable distal cut guide until it rests flush with the distal femur.

Attach the distal cut block to the adjustable distal adaptor by sliding the magnetized distal cut block into the adjustable distal adaptor.

Attach the adjustable distal adaptor and distal cut block to the adjustable distal cut guide by sliding the two legs on the adjustable distal adaptor through the anterior holes of the adjustable distal cut guide (Figure 10).

Continue sliding the adjustable distal adaptor until the block is sitting against the anterior cortex.

Pin the distal cut block into place using ⅛ inch quick release drill pins in the center pinholes of the block (Figure 11).

**Note:** To confirm the valgus angle, the alignment handle can be inserted into the adjustable distal adaptor and a ¼ inch alignment rod can be inserted and extended to the center of the femoral head.

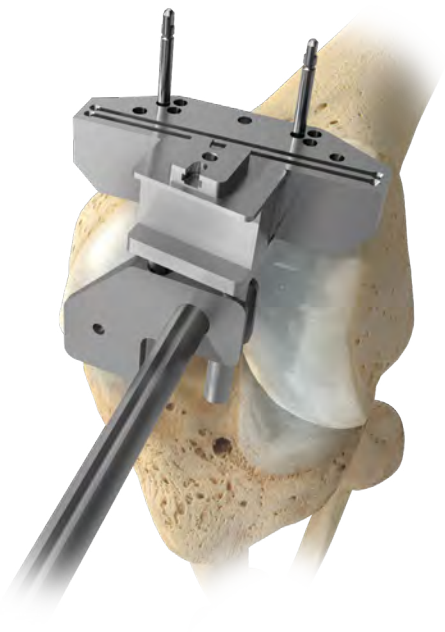


Figure 12


Figure 13

## Distal Femoral Resection (cont.)

**Option 2: Fixed Distal Femoral Resection Guide** (cont.)

Choose the appropriate left or right valgus wing and assemble it onto the IM rod by sliding it through the central hole.

Slowly introduce the IM rod to the femoral canal to depressurize the canal.

Slide the valgus wing until it rests flush with the distal femur.

- The "left" or "right" engraving on the block must face distally corresponding to the leg being prepared.

Slide the distal cut block and valgus block adaptor into the anterior holes of the valgus wing until the resection block contacts the anterior femur.

Pin the distal cut block into place using ⅛ inch quick release drill pins in the center pinholes of the block (Figure 12).

**Note:** To confirm the valgus angle, the alignment handle can be inserted into the adjustable distal adaptor and a ¼ inch alignment rod can be inserted and extended to the center of the femoral head.

Remove the valgus wing by removing the IM rod and pulling the valgus wing and valgus block adaptor distally away from the distal cut block, leaving the distal cut block in place.

Use a 1.37 mm saw blade to complete the distal resection through the selected 0 slot (Figure 13).

Check the resected distal femur using a flat instrument surface to confirm a flat resection.

Recut or file as necessary to achieve proper resection.

**Note:** Avoid over-resecting the distal femur to prevent raising the joint line. Aim to resect 1 to 2 mm into the femoral notch.

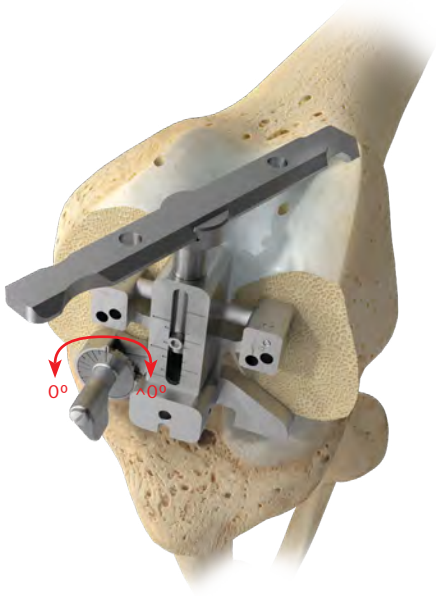



Figure 14


Figure 15

## Femoral Sizing

Assemble the selected right or left A/P sizer feet to the A/P sizer body.

Feet options include:

- Adjustable A/P sizer dial feet, left and right with the ability to set external rotation from 0 to 10 degrees (Figure 14).
- Fixed three degree A/P sizer feet, left and right (Figure 15).

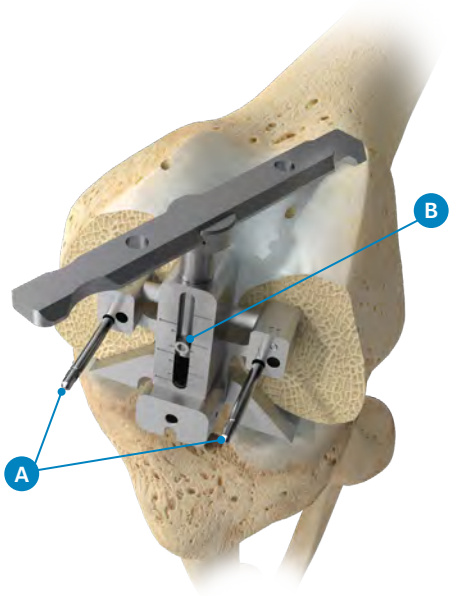



Figure 16

## Femoral Sizing (cont.)

**Note:** Assessing the A/P femoral axis, the epicondylar axis, flexion gap and the tibial shaft axis can further optimize femoral rotation.

Due to the tight space, hyperflex the knee to place the A/P sizer flush with the resected femoral distal surface.

Drill the two 4-in-1 cutting block location holes utilizing the ⅛ inch quick release drill pins (Figure 16A).

Leave the pins in place.

The femoral component size can now be read from the central scale (Figure 16B).

**Vanguard ID Tip:** If the size indicated is in-between sizes, use the smaller of the two sizes, in order to not overstuff the patellofemoral joint space.

Remove the pins and the A/P sizer.

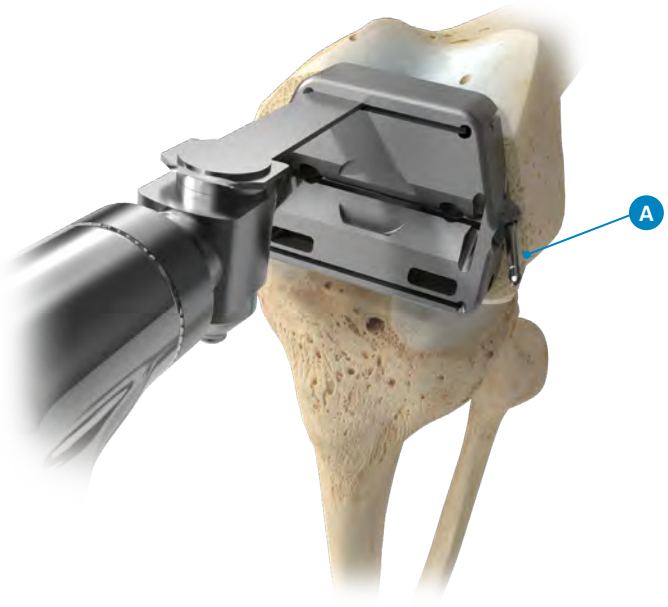



Figure 17

## 4-in-1 Femoral Cuts

Choose the Vanguard XP Femoral 4-in-1 Block that matches the selected size (Figure 17).

Place the block into the ⅛ inch distal femur holes.

**Note:** A 1.37 mm feeler blade can be used to determine the amount of anterior bone resection.

Ensure the block is sitting flush against the distal femur.

If additional stability is required, ⅛ inch quick release drill pins or the threaded headed pins can be placed in the angled side holes provided on the femoral 4-in-1 block (Figure 17A).

Once the block position is satisfactory, resect the anterior and posterior bone and the anterior and posterior chamfers with a 1.37 mm thick saw blade in a standard configuration (Figure 17).

After making the anterior resection, assess the anterior resection relative to the anterior cortex.

If downsizing is possible, the initial block can be removed and the smaller sized block applied. The anterior and posterior femur and chamfers then can be resected.

**Note:** Take care not to stretch the soft tissues by over-retracting the ligaments.

## Tibial Preparation

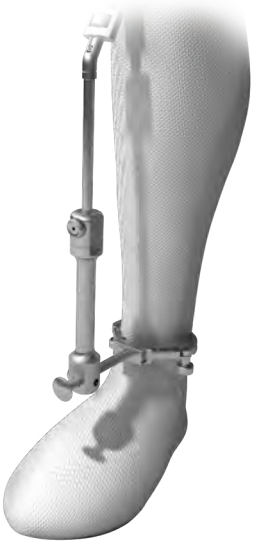


Figure 18

Figure 19

## Tibial Resection

### Resection

Attach the tibial universal cutting block (which has a 7 degrees posterior slope built-in) to the EM tibial guide.

Position the EM tibial guide on the tibia and place the spring-loaded arms of the ankle clamp around the distal tibia just above the malleoli (Figure 18).

Posterior slope is adjusted by depressing the button on the side of the EM tibial guide base and moving the base forwards or backwards to allow the tibial cutting block (with 7 degrees of slope) to increase or decrease posterior slope.

EM tibial guide shift being parallel to the long axis of the tibia gives seven degrees of posterior slope.

Adjust the initial guide height accordingly by placing the universal tibial cutting block against the proximal tibia at the estimated resection level (Figure 19).

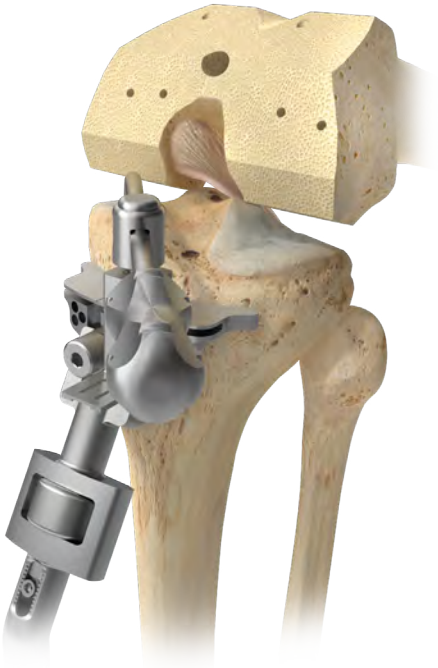


Figure 20

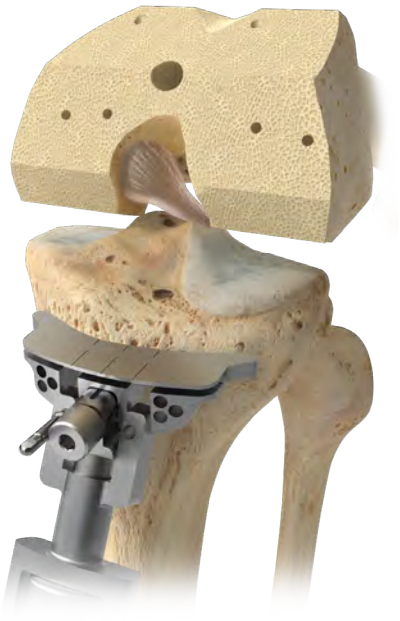


Figure 21

## Tibial Resection (cont.)

**Resection** (cont.)

Attach the tibial stylus to the universal tibial cutting block by placing the appropriate stylus tongue into the slot on the universal tibial cutting block (Figure 20):

- Select 4 mm off the medial low or 12 mm off the lateral high.
- When measuring the depth of resection, aim for a loose 4 mm or 12 mm to ensure the tibia is not over-resected.
- The center of the universal tibial cutting block should approximately align with the center of the tibia.

Secure the EM tibial guide body to the tibia with one pin (headed threaded), placed in either the medial or lateral hole in the EM tibial guide yoke (not through the cutting block) (Figure 21).

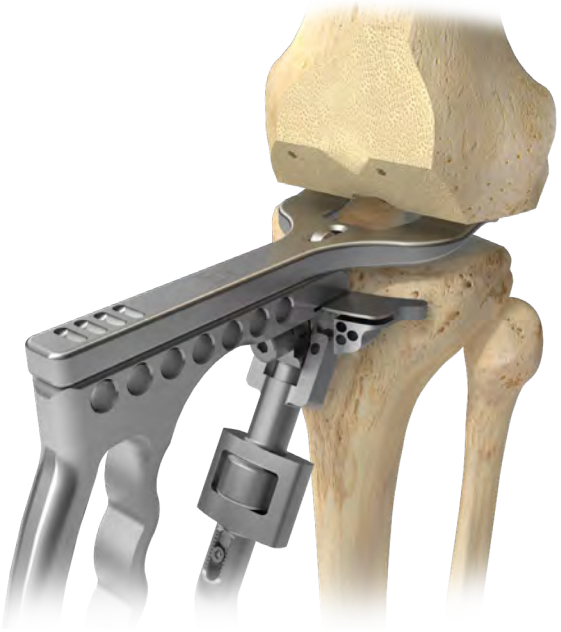


Figure 22

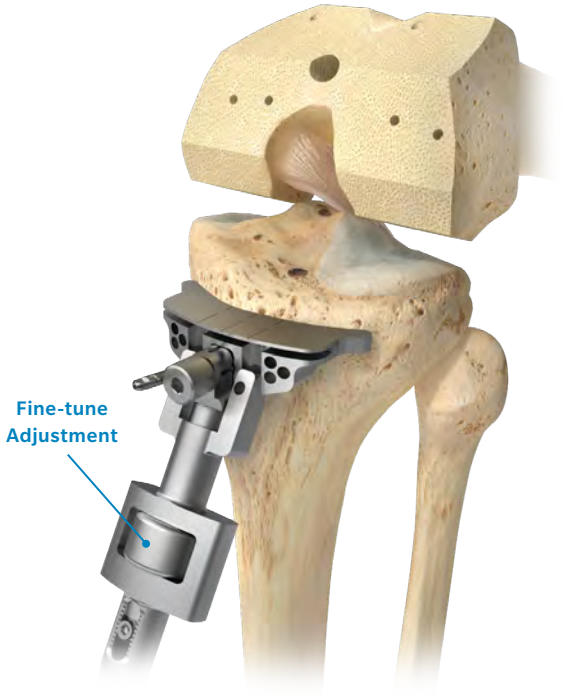



Figure 23

## Tibial Resection (cont.)

### Fine Tuning Tibial Resection Height

Bring the knee into extension and place the tibial resection spacer tongue into the slot of the tibial cutting block and allow the paddles to loosely rest against the distal cut surface of the femur (Figure 22).

Apply traction to the leg to replicate appropriate tension on the knee ligaments.

Gently apply pressure to the lever toward the body of the handle. Adequate extension space will allow the lever to rest easily on the body of the handle. If moderate to excessive force is needed to fully depress the lever, adjust the depth of the tibial cutting block by using the height adjustment thumb wheel to resect more tibial bone, and confirm the extension space by easily depressing the lever to the paddle body.

Repeat previous step at 90 degrees of flexion to ensure that flexion and extension spaces match.

Fine-tune the tibial resection level by using the height adjustment thumb wheel (Figure 23).

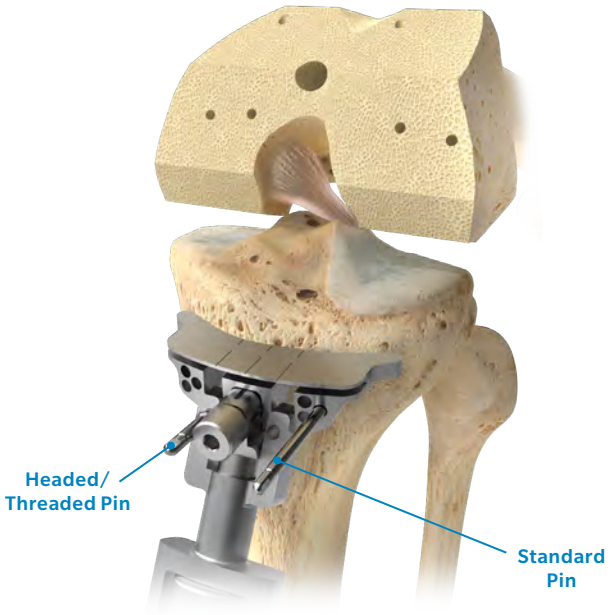



Figure 24

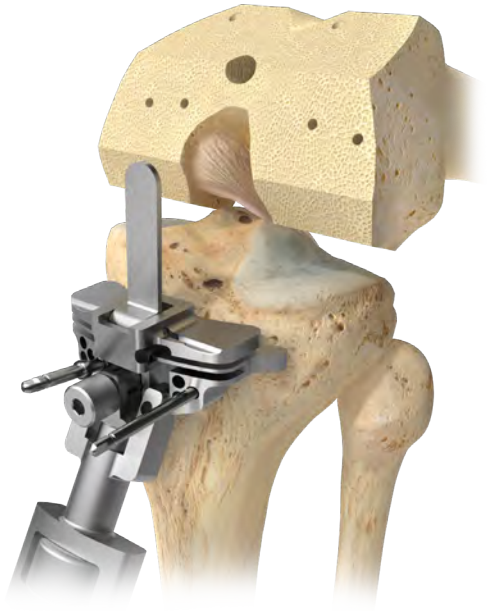


Figure 25

## Tibial Resection (cont.)

**Fine Tuning Tibial Resection Height** (cont.)

Remove the tibial resection spacer.

After the horizontal resection level is set, place one ⅛ inch quick release drill pin in the middle hole of one side of the universal tibial cutting block and another one on the opposite side (Figure 24).

To create a captured cut slot, secure the tibial cutting block insert onto the universal tibial cutting block (Figure 25).

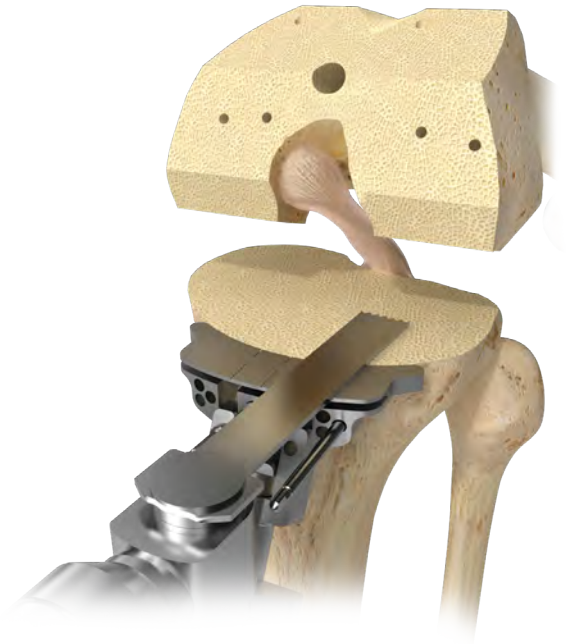


Figure 26

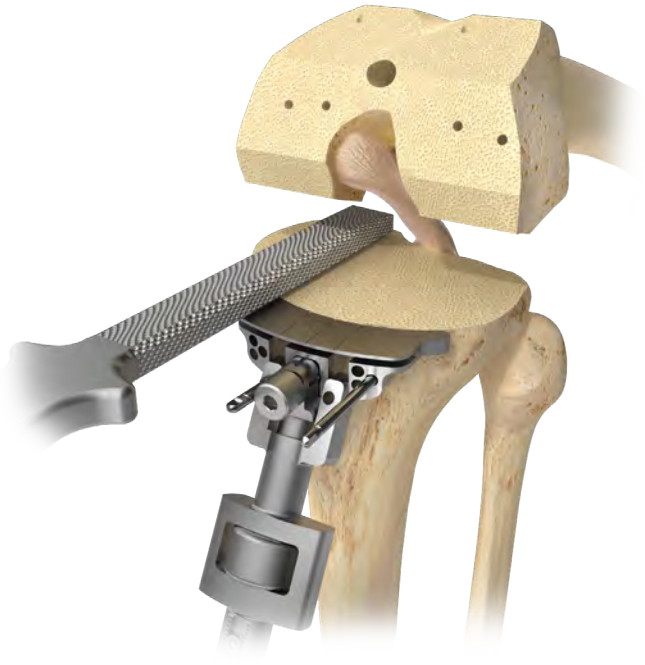


Figure 27

## Tibial Resection (cont.)

**Fine Tuning Tibial Resection Height** (cont.)

The cut block may be used as a surface block by not attaching the tibial cutting block insert (Figure 26).

Resect the tibial plateau.

**Note:** To preserve the integrity of the soft tissues, avoid dislocating the tibia while making the resection. At the same time, take care to protect the insertion point of the PCL.

Using the flat rasp, fine-tune the resected tibia to ensure flatness and to remove any rough edges by using the universal tibial cutting block as a reference (Figure 27).

Figure 28

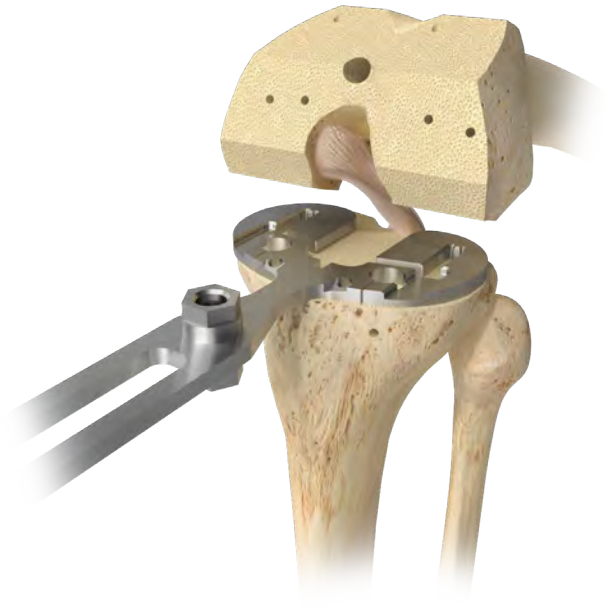


Figure 29

## Tibial Resection (cont.)

### Flexion/Extension Gap Check

Check the flexion and extension gaps with the tibial spacer to ensure that there is adequate spacing (9 mm should be able to be easily inserted) (Figure 28).

If the space is less than 9 mm:

- Check that the entire meniscus has been removed.
- Check that the back of the tibia has been fully resected.
- Check that the posterior femoral osteophytes have been removed.

**Note:** An alignment rod can also be used with the spacer block to assure proper varus/valgus alignment and slope.

### Tibial Sizing

Place the knee in maximum flexion with a Z-retractor medially and laterally to provide maximum exposure.

Select the tibial template size that provides the appropriate A/P and M/L coverage (Figure 29).

Perform an extramedullary alignment check by placing the ¼ inch alignment rod through the tibial template handle.

**Vanguard ID Tip:** To optimize flexion and prevent posterior edge loading, the posterior tibial tray should cover as much of the posterior tibia as possible.

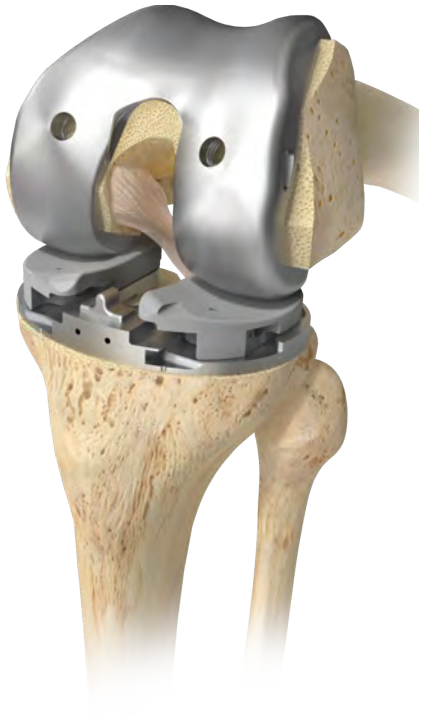


Figure 30

## Tibial Resection (cont.)

### Trialing

Based on the tibial template size, select the appropriate tibial trial and the appropriate medial and lateral bearing based on the constraint level desired (see bearing compatibility chart, page 24).

Free float the tibial trial and assembled trial bearing on the prepared tibia (Figure 30).

Place the femoral trial onto the femur with the dedicated femoral impactor.

With the trial components in place, check the range of motion and stability of the knee.

**Note:** Up to 2 mm difference in thickness between the medial and lateral bearings may be used to match the soft tissue envelope of the knee.

If range of motion and stability are appropriate, drill holes for the distal femoral pegs through the trial femoral component using the lug drill.

Determine final rotation of the tibia and mark the position in the following way:

- Extend the anterior marks of the tibial trial onto the anterior tibia with electrocautery

**Vanguard ID Tip:** When trialing range of motion, if the medial and lateral bearings rise up in flexion:

a. Confirm the tibial tray is not undersized.

b. Confirm that the posterior slope is adequate.

If the medial trial bearing rises up during flexion:

a. Confirm there is not excessive external rotation of the tibial tray.

b. Confirm that the tibial tray is not undersized

If the lateral trial bearing rises up during flexion:

a. Confirm that there is not excessive internal rotation of the tibial tray.

b. Confirm that the tibial tray is not undersized.

**Attention: Use only up to 2 mm difference in bearing thickness between the medial and lateral bearings. Utilizing bearings that differ in thickness by more than 2 mm has not been evaluated and could lead to premature failure of the device.**

Figure 31

### Tibial Preparation

Place the knee in maximum flexion and sublux the tibia anteriorly using a PCL retractor and place a Z-retractor medially and laterally.

Select the primary tibial tray trial that provides the appropriate coverage in both the A/P and M/L planes using the tibial template.

Base tibial template rotation relative to the tibial tubercle and the malleolar axis or the marks after free floating your trial.

Perform an extramedullary alignment check by placing the ¼ inch alignment rod through the tibial template handle.

**Note:** To optimize patellofemoral tracking, slight external rotation is preferable.

Assemble the tibial punch mask onto the tibial template.

When the final position has been determined, pin in place using ⅛ inch medium bone nails (Figure 31).

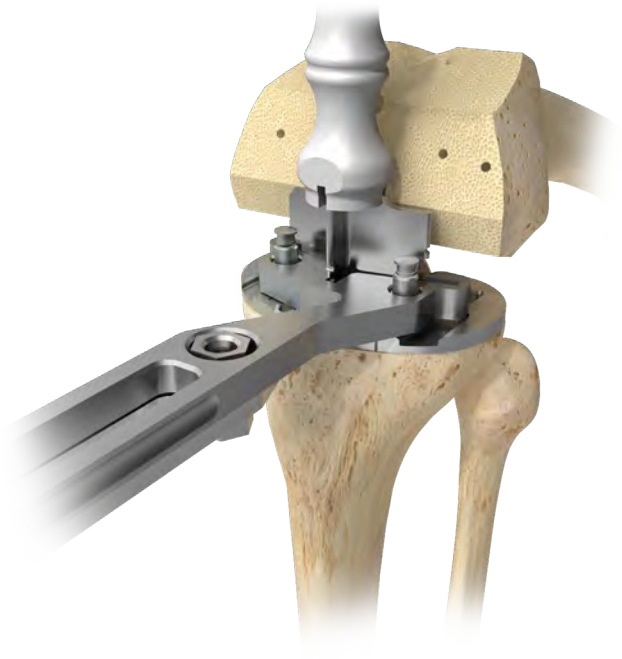


Figure 32

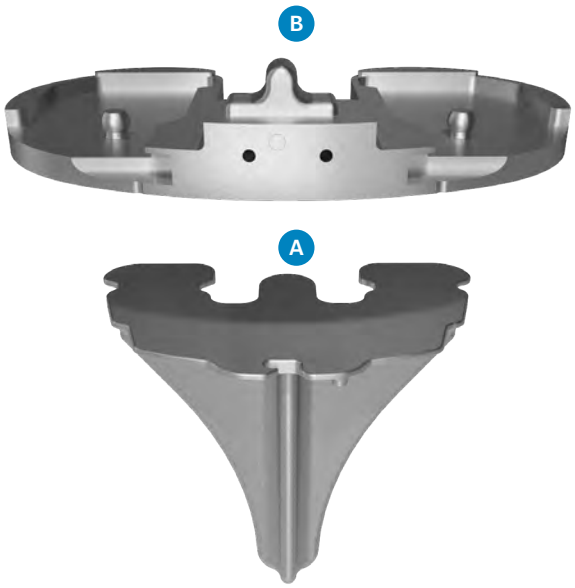



Figure 33

## Stem Preparation

Carefully impact the cruciate punch through the tibial punch mask until fully seated (Figure 32).

Assemble the appropriate tibial tray trial cruciate stem insert to the primary tibial tray trial (Figure 33 A and B).

Remove the tibial template and cruciate punch mask and insert and impact the assembled primary tibial tray trial into the tibia.

## Trialing

The following bearing combinations are options based on implant size (see the below sizing chart).

**Note:** Medial and lateral bearings may differ in thickness up to, but no greater than, 2 mm in order to accommodate the soft tissue envelope of the knee. Bearing articulation may also differ (see bearing compatibility chart, page 24).

## Sizing Chart

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **XP-CR** | 59 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 79 | 83 | 87 | 91 |
| **XP Bearings** | 59 | 63 | | | 71 | | | | 79 | | 87 | |
| **AS Bearings** | 59 | 63 | 67 | | 71 | | 75 | | 79 | 83 | 87 | 91 |
| **Locking Bar** | 59, 63, 65, 67 | | | | 69, 71, 73, 75 | | | | 79, 83, 87, 91 | | | |

# Final Trial Reduction

Figure 34

Figure 35

### Femur

With all bone surfaces and soft tissues prepared, complete a trial reduction.

Place the femoral trial onto the femur with dedicated femoral impactor (Figure 34).

The femoral trial should be centered medially and laterally over the femoral notch.

### Tibia

Based on the soft tissue envelope, select the appropriate medial and lateral Vanguard ID Bearing Trials (see bearing compatibility chart).

When inserting the bearing trials, it is easier to insert the lateral side first, then the medial side (Figure 32).

**Vanguard ID Tip:** The Vanguard XP Bearings are not symmetric. They have unique medial and lateral articulations.

The trial bearing handle can be used to place the trials onto the trial tray. Make sure the trials are in proper alignment to fully seat onto the peg.

### Patella

Select a 1-peg or 3-peg trial patellar component that corresponds to the appropriate diameter and thickness, and seat the trial onto the patella.

### Final Trial Range of Motion

With the trial components in place, check the range of motion and stability of the knee.

# Bearing Compatibility Chart

### Vanguard XP Femoral/XP-AS Bearing Compatibility

| XP Femorals | 52.5 | 55 | 57.5 | 60 | 62.5 | 65 | 67.5 | 70 | 72.5 | 75 | 77.5 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XP-AS Bearings | 63 | | | | | | | | | | | |
| | 67 | | | | | | | | | | | |
| | 71 | | | | | | | | | | | |
| | 75 | | | | | | | | | | | |
| | 79, 83, 87,91 | | | | | | | | | | | |

### Vanguard XP-CR (ID) Tibial Tray / XP-XP Bearing Compatibility

| XP-CR (ID) Tibial Trays | 59 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 79 | 83 | 87 | 91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XP-XP Bearings | 59 | 63 | | | 71 | | | | 79 | | 87 | |

### Vanguard XP-CR (ID) Tibial Tray / XP-AS Bearing Compatibility

| XP-CR (ID) Tibial Trays | 59 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 79 | 83 | 87 | 91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XP-AS Bearings | 59 | 63 | 67 | | 71 | | 75 | | 79 | 83 | 87 | 91 |

Note: Vanguard XP-AS Bearings and Vanguard AS Bearings have identical articulating geometries

### Vanguard XP-CR (ID) Tibial Tray / Locking Bar Compatibility

| XP-CR (ID) Tibial Trays | 59 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 79 | 83 | 87 | 91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XP Locking Bars | 59/67 | | | | 69/75 | | | | 79/91 | | | |

### Vanguard XP Femoral / Femoral Augment Compatibility

| XP Femorals | 52.5 | 55 | 57.5 | 60 | 62.5 | 65 | 67.5 | 70 | 72.5 | 75 | 77.5 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distal Augments 5/10/15mm | 55* | 55 | 57.5 | 60 | 62.5 | 65 | 67.5 | 70 | 72.5 | 75 | | 80 |

Note: Vanguard SSK and SSK 360 Femoral Augments are compatible with Vanguard XP Femoral Components
*5 &10 mm augments only

### Vanguard XP Femoral / Series A™ Patella Compatibility

| XP Femorals | 52.5 | 55 | 57.5 | 60 | 62.5 | 65 | 67.5 | 70 | 72.5 | 75 | 77.5 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Peg & 3-Peg Standard Thin Patellae | All Sizes Compatible | | | | | | | | | | | |

# Vanguard ID Combinations

Intact, Functioning PCL:

## Right Knee

| Levels of Articulation | | Medial Side | Lateral Side |
|---|---|---|---|
| Standard CR: | Medium constraint medially<br>Low constraint laterally | XP-XP Right Medial Bearing | XP-XP Right Lateral Bearing |
| Standard CR: | Medium constraint medially<br>Medium constraint laterally | XP-XP Right Medial Bearing | XP-XP Left Medial Bearing |
| Lateral Stabilized: | High constraint laterally<br>Medium constraint medially | XP-XP Right Medial Bearing | XP-AS Right Lateral / Left Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Medium constraint laterally | XP-AS Right Medial Bearing | XP-XP Left Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Low constraint laterally | XP-AS Right Medial Bearing | XP-XP Right Lateral Bearing |

## Left Knee

| Levels of Articulation | | Medial Side | Lateral Side |
|---|---|---|---|
| Standard CR: | Medium constraint medially<br>Low constraint laterally | XP-XP Left Medial Bearing | XP-XP Left Lateral Bearing |
| Standard CR: | Medium constraint medially<br>Medium constraint laterally | XP-XP Left Medial Bearing | XP-XP Right Medial Bearing |
| Lateral Stabilized: | High constraint laterally<br>Medium constraint medially | XP-XP Left Medial Bearing | XP-AS Left Lateral / Right Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Medium constraint laterally | XP-AS Left Medial Bearing | XP-XP Right Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Low constraint laterally | XP-AS Left Medial Bearing | XP-XP Left Lateral Bearing |

Partially Intact, Non-Functioning PCL Bearing:

## Right Knee

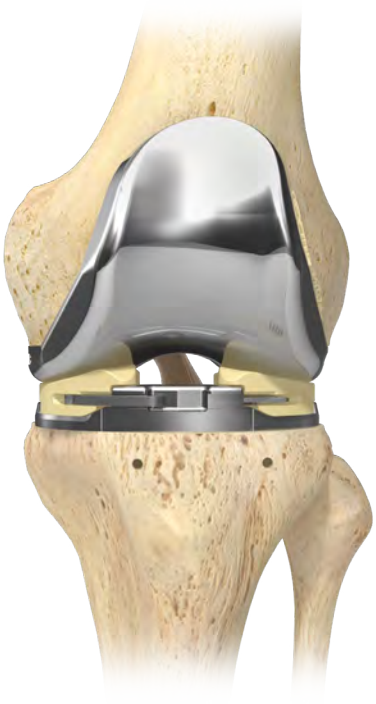
| Levels of Articulation | | Medial Side | Lateral Side |
|---|---|---|---|
| Standard AS: | High constraint medially<br>High constraint laterally | XP-AS Right Medial/Left Lateral Bearing | XP-AS Right Lateral/Left Medial Bearing |
| Lateral Stabilized: | High constraint laterally<br>Medium constraint medially | XP-XP Right Medial Bearing | XP-AS Right Lateral/Left Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Medium constraint laterally | XP-AS Right Medial/Left Lateral Bearing | XP-XP Right Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Low constraint laterally | XP-AS Right Medial/Left Lateral Bearing | XP-XP Right Lateral Bearing |

## Left Knee

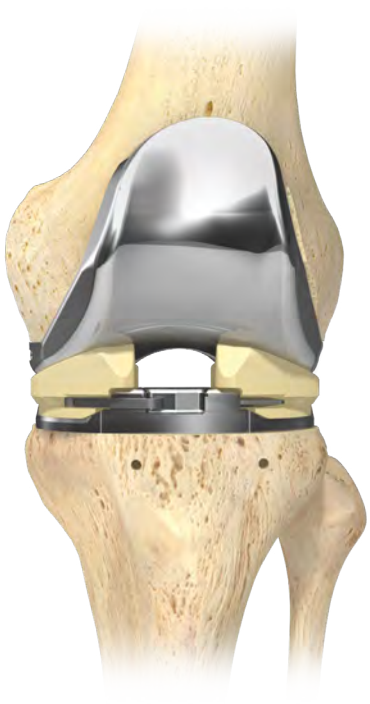
| Levels of Articulation | | Medial Side | Lateral Side |
|---|---|---|---|
| Standard AS: | High constraint medially<br>High constraint laterally | XP-AS Left Medial/Right Lateral Bearing | XP-AS Left Lateral / Right Medial Bearing |
| Lateral Stabilized: | High constraint laterally<br>Medium constraint medially | XP-XP Left Medial Bearing | XP-AS Left Lateral / Right Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Medium constraint laterally | XP-AS Left Medial/Right Lateral Bearing | XP-XP Left Medial Bearing |
| Medial Stabilized: | High constraint medially<br>Low constraint laterally | XP-AS Left Medial/Right Lateral Bearing | XP-XP Left Lateral Bearing |

**Warning:** Only use the above combinations. The use of XP-XP Lateral Bearings on the medial side has not been evaluated and could lead to premature failure of the device.

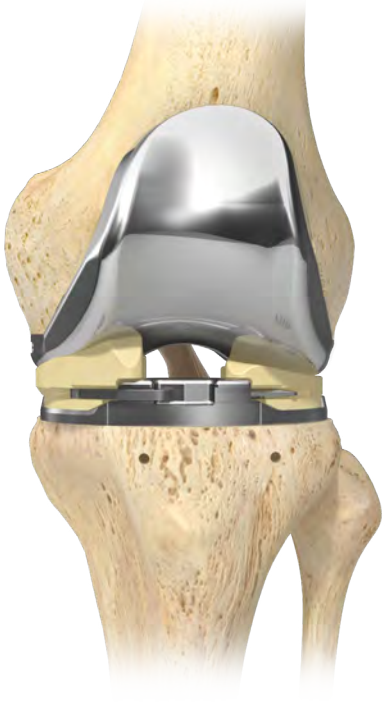
## Vanguard ID Constructs



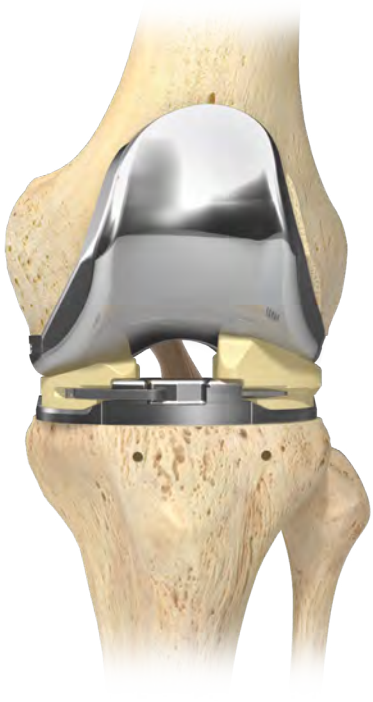
Cruciate Retaining



Anterior Stabilized



Medial Stabilized



Lateral Stabilized

## Implant Reduction

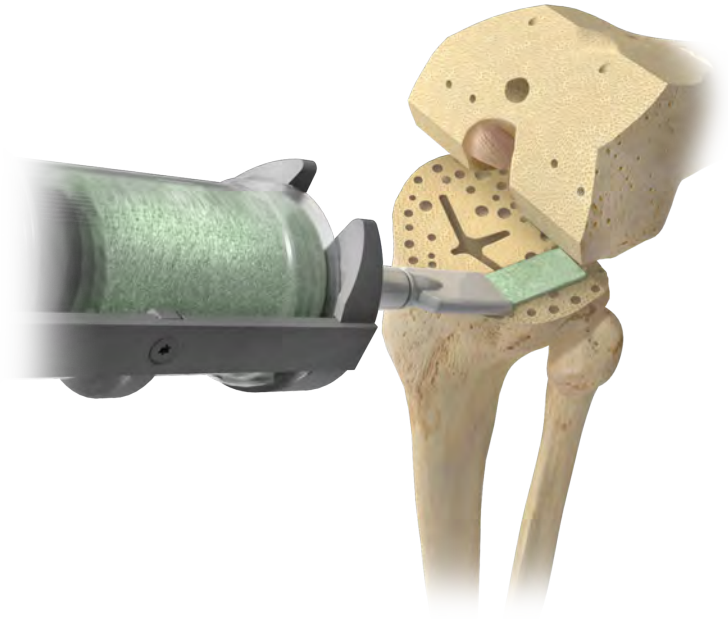


Figure 36

## Tibial Tray Implantation

If a tourniquet above the knee is not already in use, place and/or inflate throughout preparation of bone for cementation, as well as mixing, application and hardening of bone cement.

Perforate cancellous bone on the tibial side of the knee by drilling or punching an array of 2 mm holes, 3–4 mm deep, spaced 5 to 8 mm apart to improve cement penetration.

If the femoral side is dense or sclerotic, perforate it as well.

Cleanse all cement-receiving bone surfaces thoroughly using pulse lavage.

Dry with a clean, dry lap sponge.

Mix a single 40g unit of cement.

**Note:** Use of a vacuum mixing cartridge is recommended as well as application of new gloves.

As soon as the cement properties permit, apply a thin layer over the entire underside of the tibial component.

Avoid contamination of the implant-cement interface.

The cement should just overfill the pockets on underside of the tray, up to 1 mm proud posteriorly and 2 mm anteriorly.

Apply cement to the tibia and pressurize the cement, striving for penetration of 3 to 5 mm:

- Use of a cement gun/cartridge equipped with a pressurizing nozzle is recommended to deliver and pressurize cement into the prepared holes and across the flat surface (Figure 36).
- Or, cement may be applied manually and pressed forcefully into the bone using a ½ inch (12.7 mm), or wider, flat osteotome.

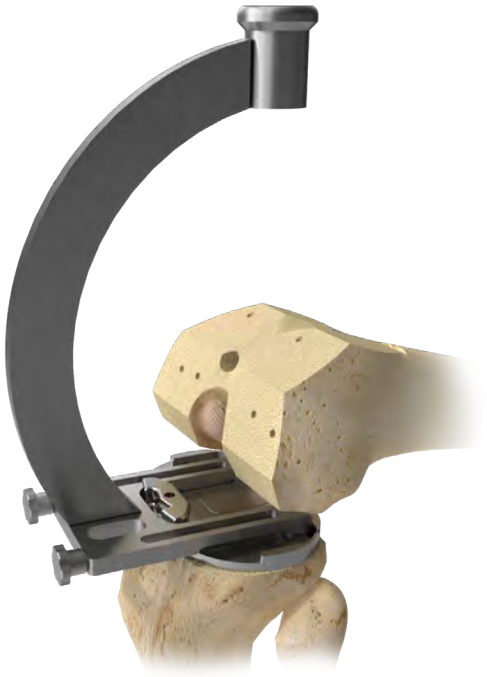


Figure 37

## Tibial Tray Implantation (cont.)

After pressurization, all cement that remains proud of the bone should be removed. A ½ inch (12.7 mm) curved osteotome, positioned concave down, is useful to scrape away excess cement.

If there is significant blood or saline on the cement surface, it can be carefully dried using an osteotome wrapped in a clean, dry lap sponge prior to final implant placement.

**Note:** While drying blood or saline, make sure not to remove the cement that was just placed on to the surface.

Insert the tibial component.

Impact the tray with the tibial impactor (Figure 37).

Remove any excess cement from the posterior aspect of the tibia using an angled elevator (Woodson).

The angled elevator can also be used to remove residual cement from the anterior aspect of the tibial tray.

Check that no cement has penetrated the locking bar slot.

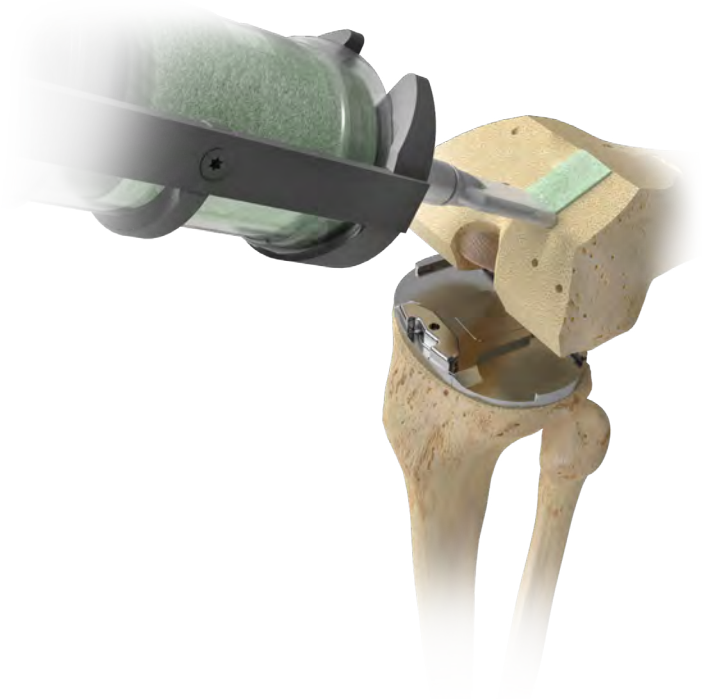


Figure 38

## Femoral Component Implantation

While mixing another 40g unit of cement, pulse lavage and dry the femoral side again.

As soon as the cement properties permit, apply a layer over the entire bone-opposing surface of the appropriate femoral component.

Avoid contamination of the implant-cement interface.

**Note:** The cement should overfill the pockets on distal and chamfer facets by 3–4 mm and on the anterior and posterior facets by 1–2 mm.

Apply cement to the prepared femur and pressurize the cement, striving for penetration of 3–5 mm, with special attention given to pressurizing cement into the anterior facet, as seating of the implant will not contribute much to cement penetration in this area (Figure 38).

Any cement remaining proud on the posterior facet should be scraped flush to the bone before proceeding, so that it is not displaced and inaccessible upon seating of the femoral component:

- Use of a cement gun/cartridge equipped with a pressurizing nozzle is recommended to deliver and pressurize cement into the prepared holes and across the femoral facets.
- Cement may also be applied and pressurized manually.

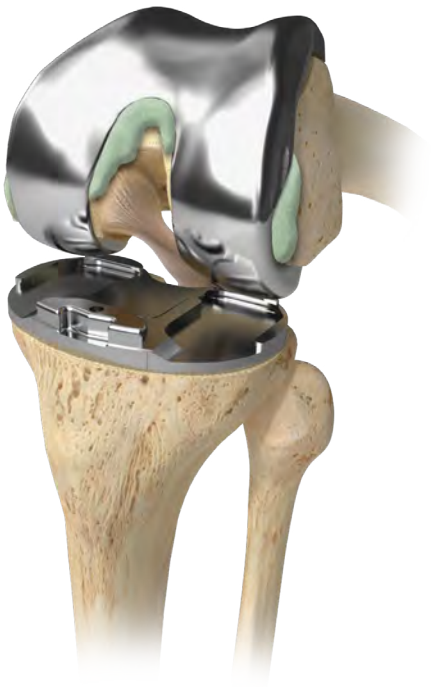


Figure 39

## Femoral Component Implantation (cont.)

Place the femoral component onto the end of the femoral impactor and insert it manually as far as possible.

Fully seat the component onto the femur using the femoral impactor.

Remove excess cement in a routine manner (Figure 39).

With the knee flexed to approximately 70 degrees, insert the lateral tibial trial bearing by hand or using a hemostat as the trial bearing handle was not intended to work when placing trial bearings on the implant.

Reduce the patella and insert the medial tibial trial bearing.

**Vanguard ID Tip:** The lateral tibial bearing is easier to insert with the medial tibial bearing absent. Once the patella is reduced, the forces on the distal femur are minimized, making the medial tibial bearing insertion easier.

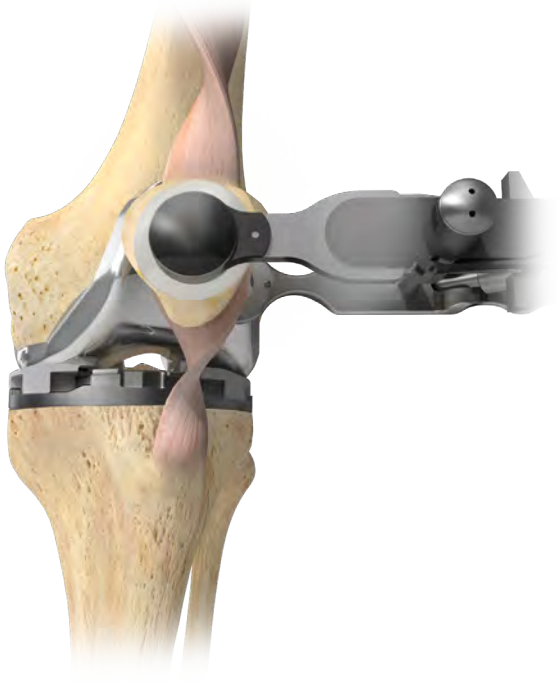


Figure 40

Figure 41

## Patellar Component Implantation

Pulse lavage and dry patella.

With the knee in full extension, apply a 2 to 3 mm thick layer of cement onto the appropriate patellar component.

Place component into the patella.

Push into position with finger pressure so the peg(s) engage(s) the prepared hole(s).

Position the patellar clamp onto the component and tighten the handle until the clamp head contacts the component.

Clamp tightly to compress the implant.

Remove extruded cement in a routine manner.

The clamp should be left in position and the knee in extension until cement hardens (Figure 40).

## Tibial Bearings and Locking Bar Implantations

Remove the tibial bearings and select the appropriate tibial bearings and insert onto the tibial tray (Figure 41).

Push posteriorly as far as possible using finger pressure.

**Vanguard ID Tip:** The bearings must lie flat on the baseplate in all directions. If not, the locking bar will not insert.

Figure 42

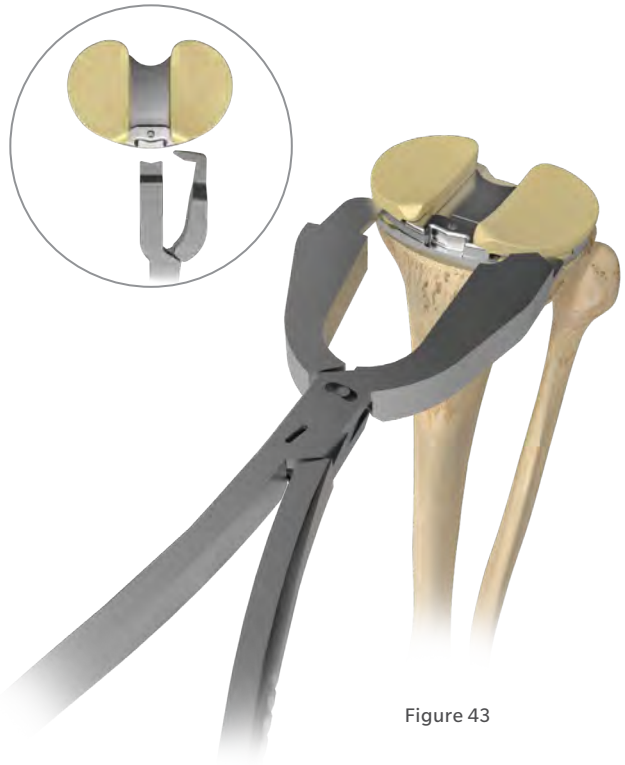


Figure 43

## Tibial Bearings and Locking Bar Implantations (cont.)

Use the bearing pre-setting tool (Figure 42) to set each bearing into position before using the locking bar inserter.

- The tool end inserts into the middle of the tibial tray and bearing slot at the same time and sets the bearings by squeezing the tool handle.

**Note:** Pre-setting the bearings can be done in either flexion or extension.

Insert the appropriate size locking bar into the medial side of the anterior tibial tray/bearing slot as far as possible using finger pressure.

**Note:** The locking bar is packaged with the Vanguard XP-CR Tibial Tray.

Place the large curved end of the locking bar inserter (etched "bar") in the notch on the locking bar. The end etched "tray" should be placed in the notch on the lateral side of the Vanguard XP-CR Tibial Tray Anterior Post (Figure 43).

Make sure the smaller square end engages on the Vanguard XP-CR Tibial Tray Post and does not block the path of the locking bar.

Squeezing the locking bar inserter will gradually introduce the locking bar until bearings are fully seated and an audible "click" is heard.

A visual and audible confirmation should be made to ensure complete locking bar insertion.

**The Vanguard® ID Total Knee Surgical Technique has been developed in collaboration with the Vanguard ID Surgeon Team:**

Prof. Tom Andriacchi
Dr. Keith Berend
Dr. Jeff DeClaire
Dr. Craig Della Valle
Dr. Jorge Galante
Dr. Adolph Lombardi
Dr. Chris Peters
Dr. Thomas Aleto



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