

NexGen[®] Legacy[®] Constrained Condylar Knee (LCCK)

Trabecular Metal[™] Coupled Tibial Cones

Surgical Technique



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Introduction

This surgical technique is intended to be an addendum to the Zimmer Biomet NexGen Legacy Constrained Condylar Knee (LCCK) Surgical Technique.

Indications for Use

The NexGen Trabecular Metal LCCK Coupled Tibial Cones are intended for use where severe degeneration, trauma, or other pathology of the knee joint indicates total knee arthroplasty. When used with the NexGen Complete Knee Solution – Legacy Constrained Condylar Knee System, the Trabecular Metal Coupled Tibial Cones are for cementless or cemented use.

Overview

The objective of using the NexGen LCCK Trabecular Metal Coupled Tibial Cone implant is to achieve stability within the proximal tibia when small to medium bone voids are present and provide proximal fixation for the tibial construct.

These implants are size specific to the NexGen Baseplate design and attach via 4 screw holes. They are available in a number of size combinations that incorporate one of four tibial cone sizes and a 5 mm tibial augment.

The coupled tibial cone that is selected must offer the ability to:

- Reinforce the metaphyseal cavity of the tibia
- Restore the anatomic joint line
- Fill a proximal tibia bone void that may result from the removal of a primary knee system
- Allow the entire assembled and seated construct (cone and tibial baseplate/stem extension) to provide appropriate support of the tibial baseplate



Figure 1

Overview (cont.)

ⓘ **Note:** The Trabecular Metal Coupled Tibial Cones are limited for use with the NexGen System with or without bone cement. The 7° cones are designed to be used with the 7° stemmed precoat baseplate while the 0° A/P wedge cones are designed to be used with the A/P wedge baseplate (Figure 1).

In revision situations, positioning of the tibial baseplate is often dictated by the interaction of the stem extension (attached to the baseplate) and the intramedullary canal. Therefore, use of offset and/or straight stem extensions should be considered during the initial cone selection process.

The Trabecular Metal Coupled Tibial Cones make use of the Trabecular Metal Medium Tibial Cone and NexGen LCKK Instrumentation which reference the IM canal. This alignment feature ensures that the position of the cone does not interfere with the desired final position of the tibial baseplate/stem extension construct. Furthermore, the instruments help the surgeon to remove bone only to the depth that matches the cone implant and to cut at a slope that matches the implant.



Figure 2

Assessment of the Tibial Bone

Remove existing tibial implants as well as residual granuloma/fibrous tissue as necessary to ensure proper exposure of the bone.

☰ **Technique Tip:** Ensure that all cement is removed from the intramedullary canal as retained cement may result in fracture or deflection of the reamer.

Prepare the tibial canal by using progressively larger intramedullary reamers beginning with the 9 mm diameter reamer. Ream to a depth that allows all the reamer teeth to be buried beneath the surface of the bone for the stem length that is desired. Proceed to ream up to the diameter size that rigidly engages the endosteal cortex of the isthmus.

☰ **Technique Tip:** Care should be taken to properly ream to the appropriate depth for the chosen stem design.

Cut the top of the tibia to the angle recommended for the baseplate using the appropriate IM tibial boom and appropriate tibial cutting guide. The technique for this step in the procedure is illustrated in the NexGen LCCK Surgical Technique.

☰ **Note:** The NexGen LCCK Coupled Cone System incorporates a 5 mm tibial augment. Ensure that the chosen depth of the tibial cut takes this into account.

It is critical that this step be performed using intramedullary alignment to ensure proper alignment between the coupled tibial cone and the stem of the tibial component. Remove the reamer and insert the provisional stem that matches the diameter and depth the last reamer prepared with the cone alignment rod attached. The provisional stem must be stable within the IM canal (Figure 2).

Straight Stem
Extension Provisional
00-5989-010-10

Cone Alignment Rod
00-5452-013-20





Figure 3

Evaluate and measure the size and orientation of the tibial defect that is present with the stem extension provisional and cone alignment rod in place in order to preliminarily assess the cone for the procedure.

Place the medium tibial cone sizing template on the tibial plateau over the cone alignment rod to determine the correct size and orientation of the tibial tray (Figure 3). The position of the cone alignment rod within the sizing template will indicate whether or not an offset stem will be necessary.

ⓘ **Note:** Check the chart on page 10 to ensure that the desired tibial component size is compatible with the selected cone size.

ⓘ **Technique Tip:** Stems are available in straight or 4.5 mm offset options. When determining which stem design is necessary, remember that the offset stem will move the center of the baseplate 4.5 mm away from the center of the IM canal.





Figure 4



Figure 5

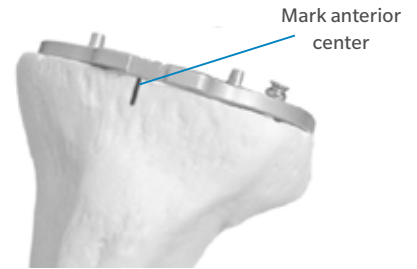


Figure 6

Preparing for the Tibial Implant

Note: Two bushing guides, drill guides, and reamer guides are provided in the medium tibial cone instrument set. Each is marked as 7° or 0°. The 7° instruments are used when implanting the 7° NexGen Tibial Baseplate. The 0° instruments are used when implanting the NexGen A/P Wedge Style Tibial Baseplate.

If a Straight Stem is to be Used

Note: If using an offset stem, skip to the offset technique on page 6.

Fit the appropriate medium cone bushing guide over the cone alignment rod onto the medium tibial cone sizing template (Figure 4). Place the straight bushing from the NexGen LCKK Knee Instrument set over the cone alignment rod and seat it in the bushing guide to ensure proper alignment between the baseplate and the IM canal (Figure 5).

Technique Tip: Ensure that proper rotation takes precedence over coverage of the tibial plateau.

Pin the selected size medium tibial cone sizing template in its desired orientation using short headed pins from the NexGen LCKK Knee Instrument Set.

With the sizing template pinned in its desired position, accurately mark the tibial bone with a bovie or methylene blue to identify the center of the anterior aspect of the tibial baseplate (Figure 6). This mark will play an important role in aligning the broach.

Medium Tibial Cone Tibial Tray Bushing Guide

00-5452-013-25



Straight Bushing

00-5987-003-00



Short-Head Holding Pins

00-5977-056-01



Medium Tibial Cone Tibial Tray Stem Drill Guide

00-5452-013-21





Figure 7

Remove the stem provisional, cone alignment rod, bushing guide, and bushing leaving the medium tibial cone sizing template pinned in place. Fit the medium tibial cone tibial tray stem drill guide onto the medium tibial cone sizing template and use the tibial stem drill from the NexGen LCKK or RH Knee Instrument sets to drill for the stem of the tibial component (Figure 7).

Drill until the engraved line on the tibial stem drill is approximately 10 mm past the top of the tibial tray drill guide to prepare for the tibial stem and the junction of the stem extension.

Remove the tibial tray drill guide and stem drill leaving the medium tibial cone sizing template pinned in place.

Proceed to Preparing for the Cone – Initial Reamer
Page 9.



Figure 8

If an Offset Stem is to be Used

Fit the medium cone bushing guide over the cone alignment rod and onto the medium tibial cone sizing template. Place the offset bushing from the NexGen LCKK Instrument Set over the cone alignment rod and seat in the bushing guide. Rotate the bushing and the medium tibial cone sizing template to find the optimal position on the tibial plateau (Figure 8).

ⓘ **Technique Tip:** If the proper rotation cannot be achieved without overhang, choose the next smaller size tibial template. Be cognizant of size compatibility with the femur (detailed in the NexGen LCKK Surgical Technique) when choosing the size of the tibia.

Tibial Stem Drill

00-5977-010-01



Offset Bushing

00-5987-004-00





Figure 9



Figure 10



Figure 11

Preparing for the Tibial Implant (cont.)

If an Offset Stem is to be Used (cont.)

When optimal coverage and orientation is achieved, note the position of the etched marks on the offset bushing relative to the etched mark on the center of the anterior portion of the medium tibial cone sizing template. Be aware that the visible portion of the offset bushing will have reference numbers that read upside down (Figure 9). The upside down numbers are 180 degrees opposed to the numbers that should be referenced on the offset bushing. It is critical that the numbers facing right side up are referenced. To ensure that the correct number is being recorded, pull the bushing up out of its seated position so that the numbers hidden below the bushing are visible (Figure 10).

The stem extension has matching numbers that will be referenced when the stem is attached to the baseplate.

Pin the sizing plate in place with short-head holding pins from the NexGen LCKK Instrument Set.

With the sizing template pinned in its desired position, mark the tibial bone with a bovie or methylene blue to identify the center of the anterior aspect of the tibial baseplate. This mark will be a reference for aligning the broach (Figure 11).

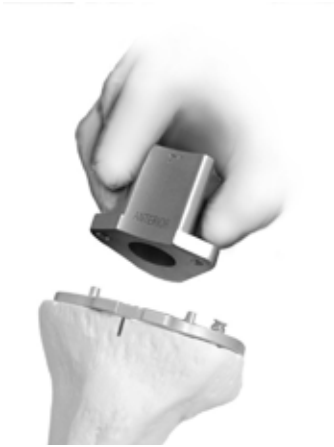


Figure 12

Remove the tibial cone bushing guide, offset bushing, and stem extension provisional assembly leaving only the medium tibial cone sizing template pinned in place.

Fit the medium cone tibial tray drill guide onto the medium tibial cone sizing template and use the tibial stem drill from the NexGen LCCK Instrument Set to drill for the stem of the tibial component (Figure 12).

Drill until the engraved line on the stem drill is approximately 10 mm past the top of the medium cone tibial tray drill guide (Figure 13).

Remove the tibial cone drill and tibial cone drill guide leaving the medium tibial cone sizing template pinned in place. Assemble the appropriate size offset stem extension provisional to the cone alignment rod and insert the construct into the tibia to its desired depth and orientation.



Figure 13

Check to ensure that the cone alignment rod sits in the center of the medium tibial cone sizing template. This can be accomplished by fitting the tibial cone bushing guide over the cone alignment rod into the medium tibial cone sizing template. Slide the straight bushing from the NexGen LCCK Instrument Set over the cone alignment rod and seat it in the bushing guide. If the stem is aligned properly, the straight bushing will fully seat into the bushing guide.

Remove the bushing guide, straight bushing and cone alignment rod/stem provisional construct from the tibia, leaving the medium tibial cone sizing template pinned in place.



Figure 14

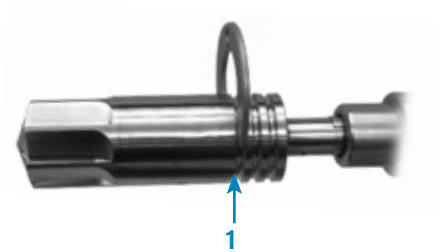


Figure 15

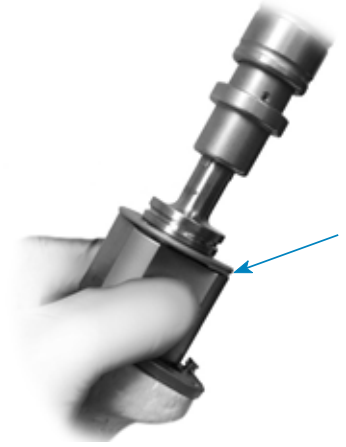


Figure 16

Preparing for the Cone

Initial Reamer

Fit the medium tibial cone reamer guide onto the medium tibial cone sizing template (Figure 14).

Attach the reamer stop to the first groove (Figure 15).

ⓘ **Note:** The first groove is the one closest to the cutting edges on the instrument.

Using the tibial cone reamer, ream until the reamer stop contacts the tibial cone reamer guide (Figure 16).

ⓘ **Technique Tip:** Stabilize the tibial cone reamer guide with your off hand while drilling to eliminate toggle, and to ensure that the drill is being used at the proper angle.

Remove the medium tibial cone sizing template and all other instruments from the tibia.

Medium Tibial Cone
Reamer Guide

00-5452-013-27



Medium Tibial
Cone Reamer

00-5452-013-29



Reamer Stop

00-5452-013-72





Figure 17



Figure 18



Figure 19

Preparing for the Cone (cont.)

Sequential Broaching (cont.)

Align the smallest medium tibial cone broach (31 x 31 mm) over the cone alignment rod (Figure 17). Make note of the mark on the tibia from the steps described in the Preparing for the Tibial Implant section. The mark on the tibia should directly align with the center mark on the medium tibial cone broach to ensure that the cone geometry does not affect the rotation of the tibial baseplate (Figure 18).

Note: Broach alignment is critical as the cone cavity will dictate the alignment of the tibial baseplate when the coupled cone and the tibial baseplate are mechanically attached.

After the described alignment checks have been performed, use a mallet to impact the broach to prepare the bone for the shape of the medium tibial cone implant. Broach until the proximal aspect of the broach is just past the tibial plateau (Figure 19).

Sequentially broach over the cone alignment rod using the next largest size until the appropriate cone size is reached. Take care to properly orient each broach so that the center line directly aligns with the center mark on the tibia.

When sequential broaching is complete, remove the stem provisional, broach and cone alignment rod.

Medium Tibia
Cone Broach
00-5452-013-31



Mallet
00-0155-002-00



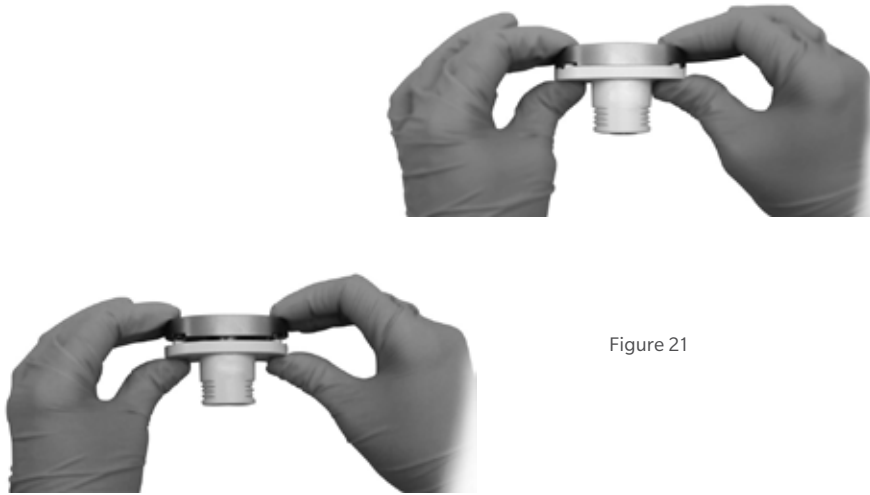


Figure 20

Figure 21

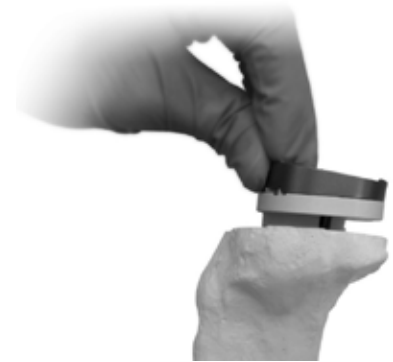


Figure 22

Provisional Assembly and Assessment

Choose the provisional cone that matches the last broach size used and the previously selected tibial baseplate size and attach it to the provisional baseplate. The two parts should be snapped together with equal pressure (Figure 20) whereas an audible click will be heard when they are securely mated (Figure 21).

ⓘ Technique Tip: In order to assess the integrity of the broached area, consider using the medium tibial cone provisionals which will give you better cavitory visualization than the coupled tibial cone provisionals. The medium tibial cone provisionals match the cone size of the coupled tibial cone provisionals.

Using finger pressure, insert the provisional construct into the tibia to assess the fit and orientation (Figure 22).

Coupled Tibial
Cone Provisional

00-5444-055-41





Figure 23



Figure 24



Figure 25

Provisional Assembly and Assessment (cont.)

Attach the selected stem extension provisional and if using an offset stem, line up the appropriate mark on the offset stem extension provisional with the etch mark on the tibial provisional (Figure 23). This mark should correspond to the mark (noted earlier) on the offset bushing.

Insert the provisional construct into the tibia and assess fit and orientation. If satisfied, a trial reduction with provisional femoral components can be performed.

☰ **Technique Tip:** When disengaging the provisional components, it helps to grasp the coupled cone provisional on the textured sides of the cone portion with the thumb and middle finger and simultaneously push out the tibial baseplate provisional with the index finger (Figure 24 and Figure 25).

If voids exist between the outside of the coupled tibial cone provisional and the tibial bone, consider packing grafting materials to fill the void. Pack morsalized grafting material around the outside of the provisional until maximum stability can be achieved.



Figure 26

Final Implantation

Remove tibial provisionals and skeletonize the bony surfaces with pulsatile lavage to clear all residual debris.

Assemble the final tibial construct on the back table by attaching the Trabecular Metal Coupled Tibial Cone to the tibial baseplate implant via the screw holes accessed from the proximal side of the tibial baseplate implant. Use the 3.5 mm hex driver to insert each of the four screws. Ensure that all of the screws are in place before final tightening occurs (Figure 26).

When using these screws, final tightening must be performed using the augment torque wrench from the Trabecular Metal Augment Instrument Kit (00-5979-010-00).

Attach the straight hex screw bit to the augment torque wrench. Tighten the augment attachment screw using the assembled augment torque wrench until the wrench “clicks and releases” indicating that the proper torque level has been achieved. If cement is to be used in between the tibial baseplate implant and the Trabecular Metal Coupled Tibial Cone in conjunction with attachment screws, final tightening must be completed before the cement begins to cure.

Caution: The torque wrench must be used to assure proper attachment screw torque. Under-tightening may result in augment and/or screw loosening. Over tightening may result in damage to Trabecular Metal Material and/or the screw thread.

Augment Torque Wrench

00-7053-001-00



Torque Wrench Straight
Hex Screw Bit

00-7053-002-00





Figure 27

Assemble the stem extension to the tibial baseplate as described in the NexGen LCCK Surgical Technique.

Insert the final construct into the tibia with or without bone cement being cognizant of proper alignment. Use an impactor to fully seat the construct into the tibia (Figure 27).

ⓘ Technique Tip: It is recommended that the tibial impactor from the Trabecular Metal Tibial Tray Instrument Set be used for this step (00-5953-056-00). This impactor locks to the tibial baseplate making it easier to control the tibial construct during impaction. The NexGen Trabecular Metal Tibial Tray Surgical Technique 97-5954-002-00 details the technique for using this instrument.

Tibial Tray Impactor

00-5953-056-00



Subsequent Removal of the Device

Should removal of the device be determined necessary by the surgeon, the construct allows for the tibial baseplate and the Trabecular Metal Coupled Tibial Cone to be separated from each other by removing the screws that attach the devices and removing the tibial baseplate from the tibia.

In order to remove the Trabecular Metal Coupled Tibial Cone from the bone, one should use a saw to cut the bone distal to the augment portion of the device. The saw should also be used to score the edge of the cone section of the device. Once this access to the cone section is achieved, one can either choose to continue cutting through the cone portion with a saw, or use thin, straight osteotomes to break off the augment portion of the device.

The cone section of the device can either be left in the bone, or can be removed by burring out the bone around the cone until it can be removed from the tibia.

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Zimmer Trabecular Metal Technology, Inc.
10 Pomeroy Road
Parsippany, New Jersey 07054
USA