

# MIS Hip Joint Replacement

## Surgical Technique

### Posterolateral MIS Approach



# MIS Hip Joint Replacement

## Surgical Technique

### Posterolateral MIS Approach

---

It is Stryker's mission to deliver state of the art MIS technologies and implants for hip and knee arthroplasty, while providing the highest standards of training and education for the medical community. Stryker's ultimate goal is to promote patient lifestyle recovery supported by responsible science. Stryker will endeavor to invent, develop and deliver procedural simplification through innovative technologies that provide greater patient satisfaction and potentially lead to long-term clinical success.

---

The decision to perform an MIS procedure is ultimately left up to the surgeon's professional medical and clinical judgment. It is the surgeon who must carefully evaluate each patient to determine if MIS surgery is indeed appropriate. In some cases the clinical risks that apply to MIS total joint arthroplasty may be greater than conventional total joint arthroplasty. Stryker strongly recommends that surgeons complete a formalized training program before attempting these operative techniques on their own.

## **Table of Contents**

---

<b>Stryker MIS Technique for THA Introduction</b>	<b>1</b>
<b>Posterolateral MIS Technique</b>	<b>2</b>
<b>Incision</b>	<b>3 - 4</b>
<b>Capsulotomy</b>	<b>5</b>
<b>Femoral Neck Osteotomy</b>	<b>6 - 7</b>
<b>Acetabular Reaming</b>	<b>8 - 9</b>
<b>Acetabular Implant Placement</b>	<b>10</b>
<b>Femoral Canal Preparation</b>	<b>11</b>
<b>Implant Trial Reduction</b>	<b>12</b>
<b>Acetabular and Femoral Implant Insertion</b>	<b>13</b>
<b>Wound Closure</b>	<b>14</b>
<b>Stryker MIS Instrumentation</b>	
<b>The Retractor Set</b>	<b>15 - 17</b>
<b>Femoral Set</b>	<b>18 - 19</b>

---

## Stryker MIS Technique for THA

Minimally Invasive Surgery (MIS) is a surgical technique, which may enable the surgeon to potentially reduce the amount of soft tissue dissection, manipulation, and overall disruption of the surgical site throughout the surgery.

Minimally invasive procedures bring technique and implant together in a synergy that may improve patient outcome and may reduce recovery time. MIS techniques and instrumentation may minimize the impact of the surgical procedure on tissue and/or bone that may accelerate post-operative rehabilitation, recovery, and return to pain-free function.

The MIS total hip arthroplasty (MIS-THA) procedures you are going to learn about in this surgical protocol each begin with a single incision. The purpose of the incision is to minimize soft tissue trauma dissection that may reduce muscle and other tissue trauma. This may contribute to reduced patient pain and decreased recovery time.

The key to MIS is soft tissue management. Although bone and implant management are no less important than in conventional hip surgery, the incremental benefits of pain reduction and improved strength are closely related to soft tissue management.

## Posterolateral MIS Technique

Conventional total hip arthroplasty relies on maximum exposure of the joint so the entirety can be seen at once. Such exposure, however, requires much of the soft tissue to be cut, inflicting damage on tissue that can increase pain and recovery time.

MIS-THA may reduce tissue trauma, which may reduce the patient's pain and lead to a quicker recovery. To achieve these results, the surgeon using MIS-THA must pay as much attention to the position of the leg and to soft tissue management as to the instruments that make the procedure possible. At the same time, the limited field of vision offered by MIS requires that the surgeon develop greater confidence using the sense of touch (tactile sensation) to supplement visualization.

As you work through a MIS-THA, it helps to ask yourself two questions:

1. **What am I doing with the soft tissues at this stage of the procedure?**
2. **What am I doing with the bone at the stage of the procedure?**

Preoperative planning aids in the selection of the appropriate implant style and size for the patient's hip pathology. Preoperative X-ray analysis can be used to evaluate:

- **Optimal femoral stem fit**
- **Prosthetic neck length**
- **Neck offset**
- **Acetabular component sizing**

Determination of probable implant style and size can facilitate operating room preparation by ensuring that the appropriate size selection is available. Anatomic anomalies that could prevent the intra-operative achievement of the established preoperative goals may also be detected through such planning.

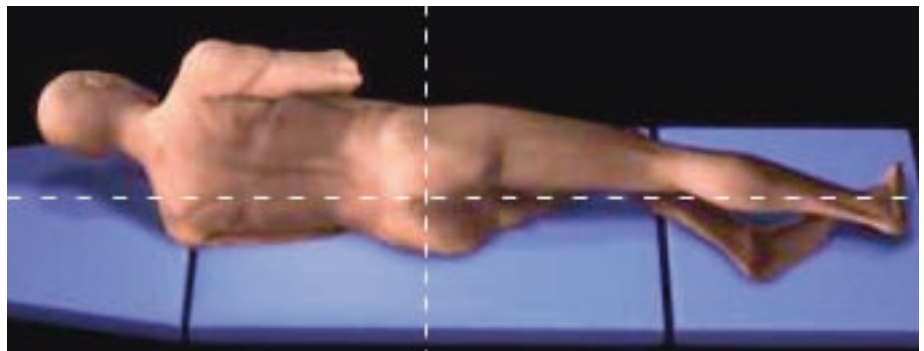
The patient position is the same for both the Posterolateral and for the Anterolateral Approach.

The patient is placed in the **lateral decubitus position with the operative hip superior**. Care should be taken to position the pelvis so that a line connecting the anterior superior iliac spines (ASIS) is vertical when viewed from both the end and the side of the operating table.

A pelvic stabilizing device must be used to ensure that the patient's pelvis remains stable throughout the procedure. The dependent leg is flexed at both the knee and the hip so that the hip is flexed up to 45°. As the image shown here makes clear, this position also maintains a perpendicular orientation of the hip to the table so that improper implant placement can be avoided. (*See illustration below*)

A general guide to follow for a MIS Hip posterolateral procedure is an incision length of 6 to 10cm. The incision may need to be lengthened beyond 10 cm to accommodate a patient's anatomy and size. Retractor placement is critical to the success of the MIS-THA. Therefore, it is recommended that the surgeon begin with a standard incision. Once he is familiar with retractor placement, he can make the incision progressively smaller.

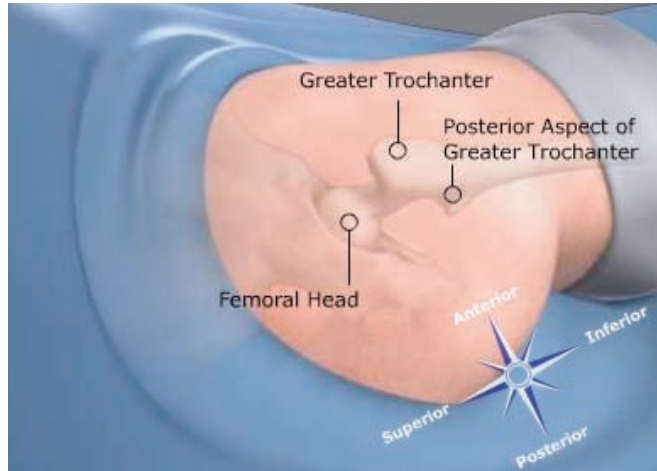
It is also recommended that the surgeon select smaller patients to begin with. This approach helps ensure a safe and reproducible procedure.



## Incision

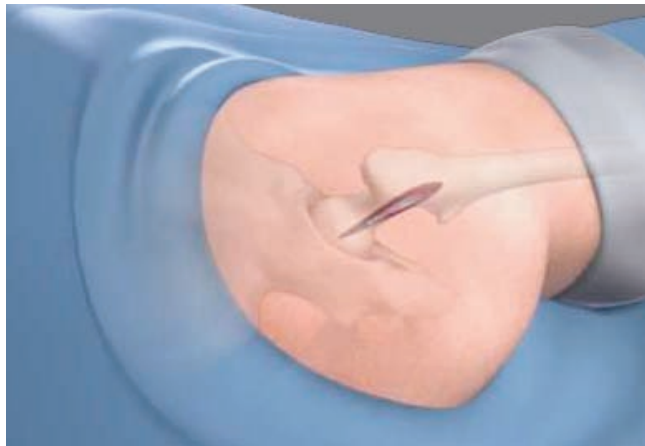
Palpate in detail the posterior aspect of the greater trochanter on the outer aspect of the thigh. The posterior edge of the greater trochanter is more superficial than the anterior and lateral portions, so it is easier to palpate. (*Figure 1*)

Use a sterile marking pen to mark the tip of the posterior aspect of the greater trochanter.



**Figure 1**

As a general guideline, the incision can range from 6 to 10cm, extending two thirds proximally and one third distally from the posterior tip of the greater trochanter. (*Figure 2*)



**Figure 2**

Divide the subcutaneous tissue. Identify and incise the gluteus fascia on the posterior aspect of the femur. Verify that the fascial incision is in line with the initial skin incision and the muscle fibers of the gluteus maximus. (*Figure 3*)



**Figure 3**

Identify the gluteus maximus muscle and split the fibers bluntly, starting at the tip of the greater trochanter and incising posteriorly. (Figure 4)

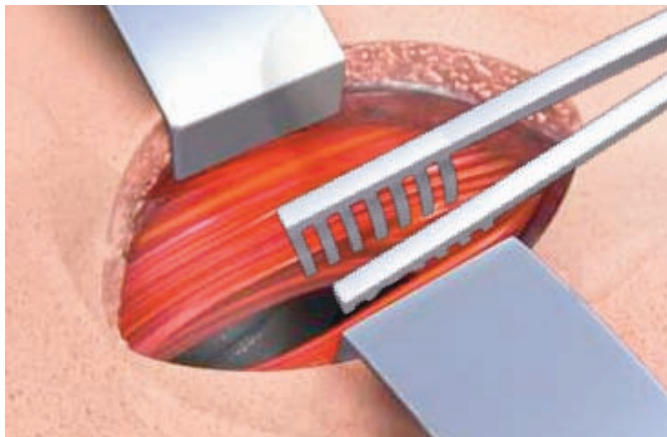


Figure 4

Retract the fibers of the split gluteus maximus and the deep fascia of the thigh anteriorly and posteriorly to allow for adequate exposure to the external rotator muscle tendons. Because of the proximity of the sciatic nerve, do not use retractors with teeth, which could accidentally sever the nerve. (Figure 5 / 6)

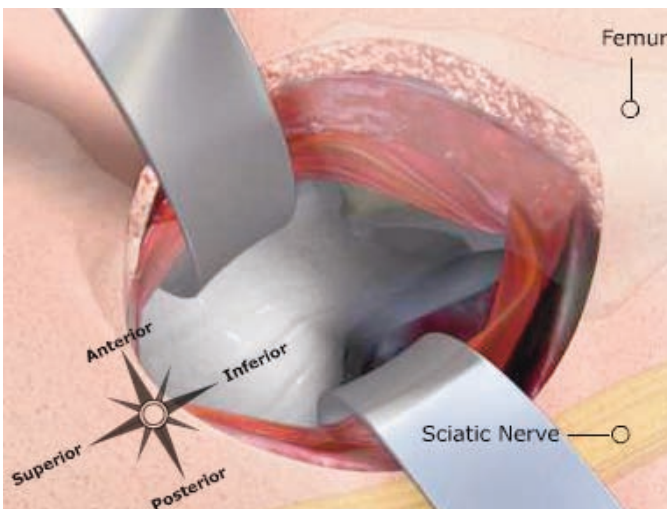


Figure 5

Rotate the leg internally enough to stretch the short external rotator muscles. This positioning makes the muscles and the capsule more prominent, clearly visible, and moves the operative field further from the sciatic nerve.

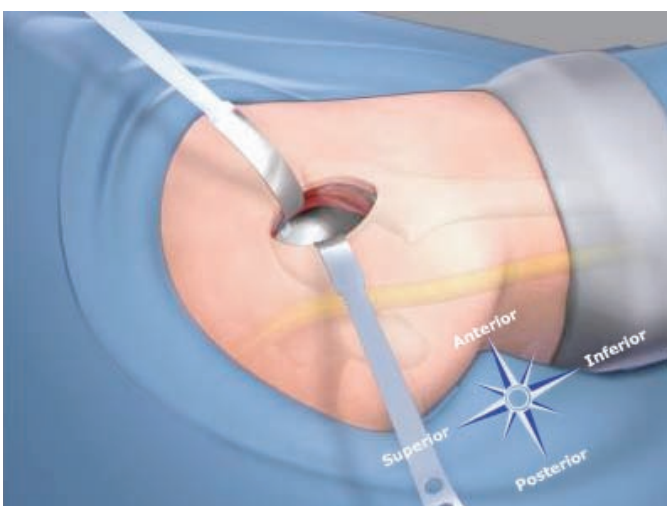


Figure 6

## Capsulotomy

Incise the external rotators off the posterior femur as close to the bone as possible.

Tag the tendons with sutures.  
(Figure 7)

Reflect the tendons posteriorly and lay them over the sciatic nerve to protect it during the remainder of the procedure.

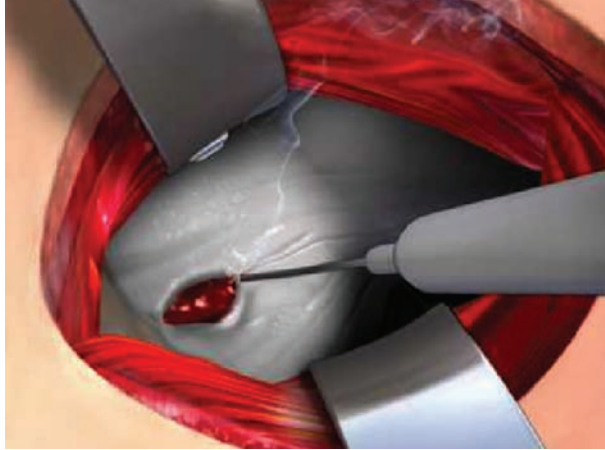


Figure 7

Incise the capsule in line with the femoral neck to the level of the acetabular rim.  
(Figure 8)

Excise the capsular attachment to the femur around the base of the neck.

Tag the edges of the capsular attachment with sutures for reattachment at the end of the procedure.

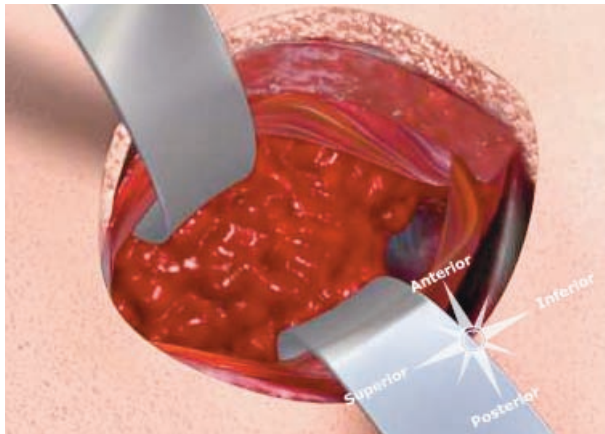


Figure 8

Reflect the capsule edges to provide exposure of the neck. (Figure 9)

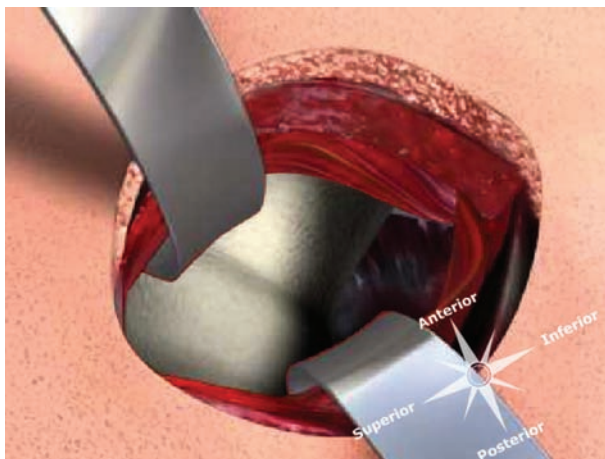


Figure 9



## Femoral Neck Osteotomy

Dislocate the hip by flexing the knee and internally rotating the leg slowly to avoid injury to the knee.

Resect the remaining capsulotomy and soft tissue around the neck with electrocautery, exposing the neck to the level of the lesser trochanter. The correct neck resection level ensures proper stem fit and placement. Anatomic landmarks (identified during templating) used in conjunction with the neck resection guide allow the correct resection level to be determined easily. (Figure 10)

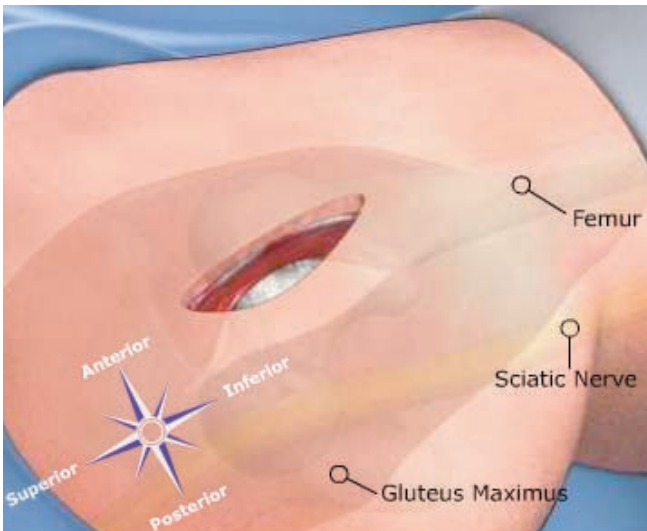


Figure 10

After the level of the neck cut has been determined, one Cobra retractor (or a Narrow Hohmann) is placed over the posterior aspect of the neck, and another is positioned over the greater trochanter. The femoral neck exposure is located between these two retractors (Figure 11). Through careful preoperative templating, the neck resection guide is placed on the anterior aspect of the exposed proximal femoral neck.

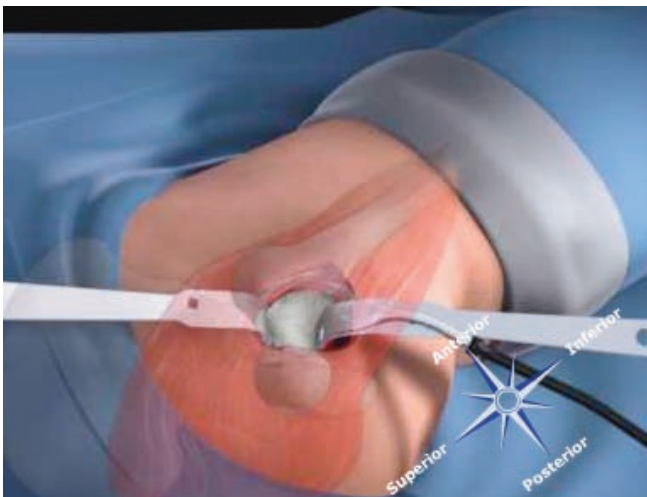


Figure 11

## Using the Neck Resection Guide

(Figure 12 and 13)

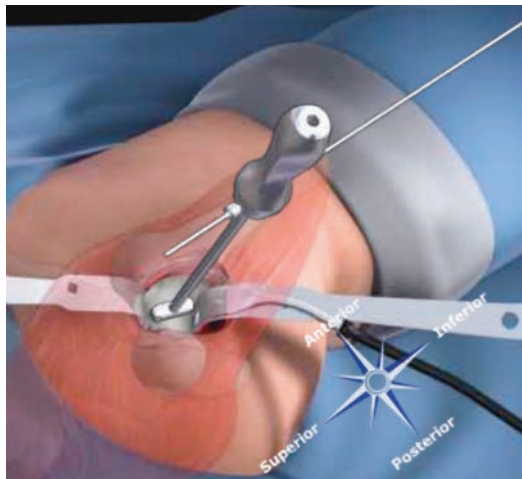


Figure 12

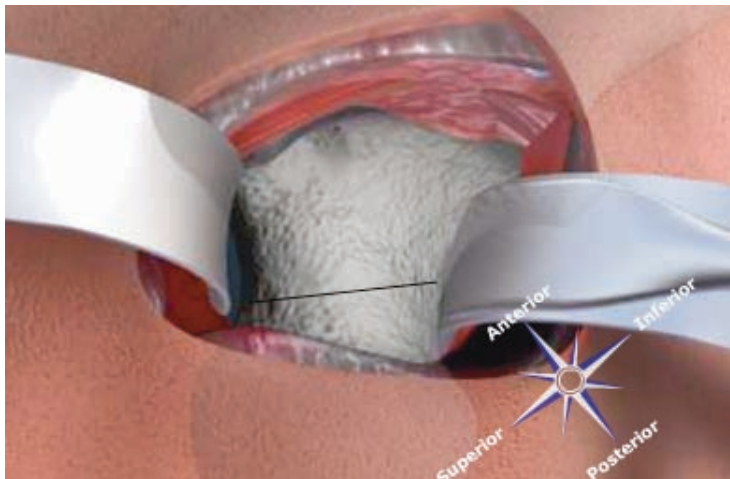


Figure 13

While holding the Neck Resection Guide Assembly by the handle, place the left or right guide leg on the anterior/posterior aspect of the exposed proximal femur (Figure 12). The width of each leg guide is 1 cm and can be used as an estimate of distance from the lesser trochanter. The Alignment Rod should be positioned so that it is parallel with the long axis of the femur. Electro cauterization or Methylene Blue can then be used to indicate the neck resection level (Figure 13).

With the leg rotated internally, make the femoral neck cut with an extra small oscillating saw blade. The axial resection is made at the medial border of the greater trochanter to connect it with the neck resection. (Figure 14) Use the Femoral Head Extractor with the T-Handle to elevate the head and extricate it from the wound.

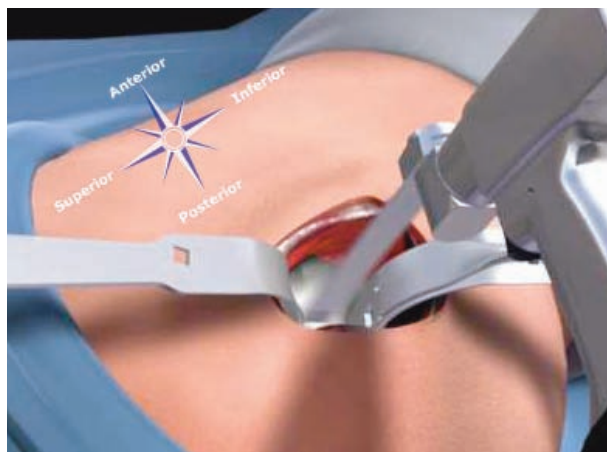


Figure 14

## Using the Femoral Head Extractor

Puncture the surface of the femoral head by applying axial force onto the Femoral Head Extractor Assembly. Continue applying axial force to the assembly and begin to rotate the T-Handle clockwise. When approximately 50% of the Femoral Head Extractor's threads have been engaged, the femoral head can be pulled or levered out of the incision.



Figure 15

## Acetabular Reaming

The acetabulum is prepared with the leg in the neutral position. Retract the proximal femur anteriorly. Place a Cobra Retractor or a Narrow Hohmann Retractor over the anterior acetabular column along the bony margin. Take care not to pinch any soft tissue between the retractor and the acetabulum. To protect the sciatic nerve, use Narrow Hohmann Retractors or Cobra Retractors to reflect the soft tissues posteriorly and superiorly. Position the retractors over the capsule edges to facilitate the release and removal of the labrum and to gain adequate exposure for reaming.

The Narrow and Wide Hohmann Retractors have sharp tips that can fix to bone. If necessary, additional fixation can be achieved through the use of the Retractor Impactor. Once the Hohmann is placed within the incision, insert the Retractor Impactor into the impaction window of the Hohmann and impact with the Slotted Mallet. Caution must be taken not to break through the superior wall of the acetabulum. Excise the labrum and osteophytes to allow proper visualization of the bony anatomy and to improve ease of reaming.

To improve visibility, the Light Pipe can be attached to the Narrow Hohmann, Wide Hohmann, or Left/Right Acetabular Retractors. To assemble the Light Pipe onto the Retractor, insert the two distal tabs into the Retractor slots. Slide the device upward until the tabs hit the top edge of the slots. Snap the two proximal tabs into the slot on the top surface of the Retractor. To disassemble, reverse the preceding steps. The device can be pre-assembled to the fiber optic cable when you begin these steps. (Figure 16)



Figure 16

Assemble the reamer. To obtain congruity during reaming, an optional 45° abduction/20° anteversion alignment guide can be attached to the reamer handle. When the alignment guide is perpendicular to the long axis of the patient, it will orient the reamer handle at 45° of abduction, placing the axis of the spherical reamer at the appropriate 45° of inclination. The reamer handle can then be positioned at 20° of anteversion by aligning the left/right anteversion rod, thus paralleling the long axis of the patient. (Figure 17)

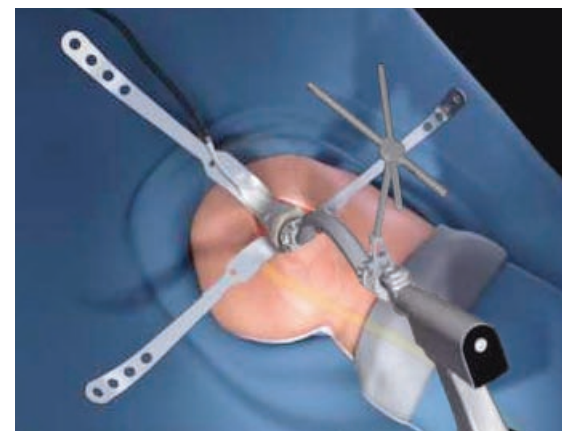


Figure 17

Although the Alignment Guide offers some assistance, it is important to evaluate anatomic landmarks critically before placement of the metal shell. These anatomic landmarks include:

- **Anterior and posterior walls of the acetabulum**
- **Sciatic notch (if visible)**
- **Acetabular fossa**

It is recommended that reaming begin with an acetabular reamer that is 4 mm smaller than the templated or gauged size. (*Figure 18*)

Increase reamer size in 1mm increments until the final sizing is achieved. The reamer head should be driven to the point where the crossbars contact the acetabular wall at the peripheral lunate region. Take special care to avoid enlarging or distorting the acetabulum by eccentric reaming.

Use a finger to feel how much reaming has been done. Palpation is key during the reaming process to augment visualization. Final acetabular reaming should show the hemispherical acetabulum denuded of cartilage, with the subchondral plate preferably intact and the anterior acetabular wall preserved.



**Figure 18**

## Acetabular Implant Placement

To evaluate the size and congruity of the prepared acetabulum, withdraw the reamer shell. Thread the appropriate window trial of the reamer shell onto the acetabular shell's Positioner Impactor. Place the window trial in the acetabulum.

**Note: It is important to engage the threads fully and to seat the Positioner Impactor against the trial because the threads on the window trial could become damaged when impacted into the acetabulum.**

The trial is “windowed” for visualization and assessment of fit, contact, and congruency of the trial within the acetabulum.

Select the appropriately sized acetabular cup implant. If desired, the abduction/anteversion alignment guide can be attached to the shell Positioner Impactor to help establish the recommended 45° of abduction inclination and 20° of anteversion. Thread the metal shell onto the Impactor using the threaded hole in the dome of the metal shell.

**Note: It is important to engage the threads fully and to seat the Impactor against the shell. Otherwise, the threads on the metal shell could become damaged, resulting in difficulty of the removal of the Impactor from the shell.**

Remove the labrum and any osteophytes from the acetabulum. Retract soft tissue during cup implantation to avoid impingement between the cup implant and the acetabulum.

The recommended metal shell abduction angle of 45° is determined by positioning the alignment guide perpendicular to the long axis of the patient. Anteversion is set by moving the cup Impactor so that the left/right anteversion rod is parallel to the long axis of the patient. Evaluate anatomic landmarks before placement of the metal shell.

Impact the metal shell into the acetabulum to achieve a tight, stable press fit. Loosen the thumbscrew on the alignment guide. Remove the alignment guide. Unthread the Impactor handle from the shell. Determine the depth of shell seating by viewing through the threaded hole in the dome. Use the cup's trial insert to reevaluate the cup face position and to provide a final check of hip mechanics.

## Femoral Canal Preparation

Prepare the femoral canal by placing the Femoral Elevator deep into the neck and placing Narrow Cobra retractors or Narrow Hohmann retractors around the neck and greater trochanter for access to the canal meatus.

**Note:** To achieve the proper trajectory during femoral broaching, ensure that all remnants of the external rotator tendons have been excised from the femoral neck.

Assemble the axial starter reamer. The axial starter reamer is circumferentially graduated along the flutes, indicating both the depth and width of the implant body. The fitting on the proximal end of the axial starter reamer allows it to be used manually with T-handle or power equipment. (Figure 19)

Insert the axial starter reamer into the femoral canal. This reamer has a sharpened point to facilitate entry and should be inserted to the depth of the final rasp. Its proper depth can be determined by aligning the designated engraved grooves on the reamer shaft, for the size templated, with the medial calcar. Lateral pressure on the reamer will help provide for a neutral orientation of the implant.

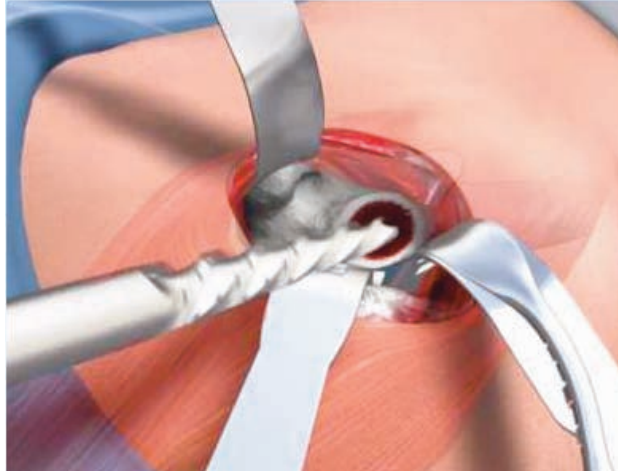


Figure 19

Use the femoral rasp to contour the mediolateral and anteroposterior aspects of the femur. The rasp geometry is relative to the surface enhanced proximal geometry in the mediolateral plane and offers a press-fit in the anteroposterior plane, thus approximating the final stem seating level.

Lock the rasp handle firmly onto the rasp by inserting the post into the corresponding hole on the handle and pressing the two together. Make sure the version post is aligned with the positioning slot on the face of the rasp. (Figure 20)



Figure 20

Begin rasping with the smallest rasp. Rasp size can be increased sequentially until the rasp matches the planned stem size and application. The final rasp should seat firmly against medial and lateral cortical bone.

The rasp has been inserted to the proper depth when the rasp seats tightly within the femoral canal based on visual and auditory clues, such as an increased pitch of sound with blows on rasp handle and an increased resistance to forward advancement.

Leave the final rasp in the canal and remove its handle. (Figure 21)



Figure 21

## Implant Trial Reduction

To confirm the proper placement of the femoral and acetabular components before final selection and implantation of the components, it is important to attempt trial reductions and obtain routine intraoperative radiographs, especially during early experience with the mini-incision technique.

The trial assembly consists of

- rasp
- trial neck
- trial head
- trial cup liner

The assembly is used to provide a thorough evaluation of the hip mechanics during trial reduction. Modifications to the preoperative plan in terms of neck length and/or head diameter can be made.

Select a trial neck that has the same basic neck length as the planned implant size.

Place the trial neck over the post of the rasp by positioning it onto the slot located on the proximal tip of the rasp and pressing firmly.

Select a plastic tapered trial head and place it onto the trial neck. The tapered trial heads are available in a variety of offset lengths to create the desired neck length of the prosthesis.

Perform a trial reduction of the hip.  
(*Figure 22*)



**Figure 22**

Adjust neck length until the leg lengths are equal. Stability can also be checked by telescoping the leg and performing a full range of motion. If the leg is unstable, re-evaluate the acetabular cup and the face orientation of the trial liner by repositioning the cup trial insert within the metal shell in 30° increments. This procedure creates optional positions in which the cup insert may be oriented.

Remove the trial head and trial neck. Reattach the rasp handle to the rasp. To preserve the integrity of the handle and locking mechanism, use the slotted mallet to remove the rasp.

## Acetabular and Femoral Implant Insertion

Insert the appropriately sized cup and gently introduce it into the shell.

Align the barbs and grooves so that the cup insert seats flush into the acetabular cup.

Make sure that all soft tissue has been retracted. For proper seating, position the Positioner Impactor handle into the inner diameter of the cup insert. (Figure 23 and 24)

Strike the Positioner Impactor handle with four firm mallet blows to seat the cup insert fully. Verify that the insert is fully seated and properly aligned into the acetabular shell. Insert the femoral stem Impactor into the recess on the proximal end of the femoral stem.

**Note: To help prevent damaging the femoral stem or the femoral stem Impactor, be certain that the femoral stem Impactor is fully seated against the proximal face of the femoral stem.**

**Do NOT continue impacting the femoral component if visual and auditory clues indicate that the resting position of the femoral component has been reached, even if the femoral component is not yet down to the level of the rasp trials. If the femoral component comes to a rest at a level below that of the rasp trial, it is very likely that a femoral split has been created. It is imperative that the surgeon investigates this possibility.**

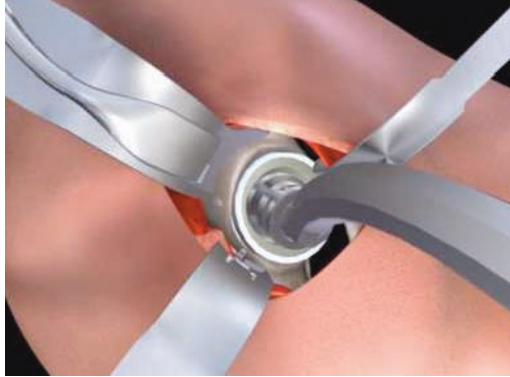


Figure 23



Figure 24

Use a mallet to seat the stem into the canal. If visual and auditory clues indicate that the resting position of the femoral component has been reached, special care should be taken to avoid continued impaction of the femoral component, even if the femoral component is not yet down to the level of the rasp trials.

**Note: Before implanting the head assembly, the neck length selection may be re-evaluated using the trial head by placing the trial head onto the stem's neck and reducing the hip to verify that the mechanics have not been altered because of implant seating.**

Select the appropriate implant head and place it onto the dry trunnion of the femoral stem.

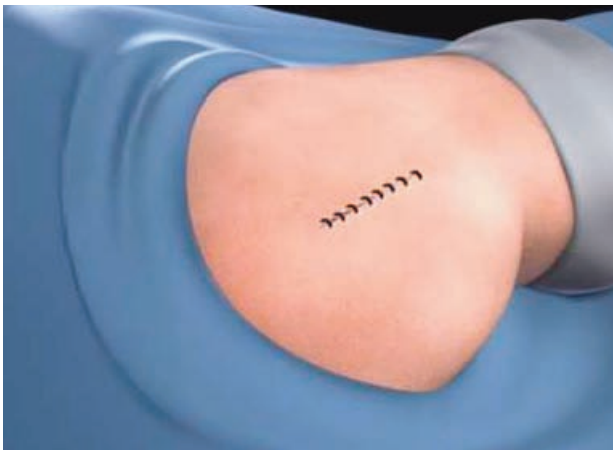
Align the implant's head Impactor over the implant head and strike the Impactor once with a mallet. Reduce the femoral head into the acetabular cup and check for stability and range of motion.



## Wound Closure

Completely encase the femoral head of the prosthesis within the acetabulum by re-approximating the tagged inferior and anterior capsule.

Tendons have some elasticity and are stronger than osteoporotic or osteoponic bone, so the short external rotators should be re-attached to the gluteus maximus tendon that is still attached to the greater trochanter. Attaching the tendons in this way places them in a physiologic position to increase their potential to remain attached. Complete the fascia and skin closures according to established procedures. (Figure 25)



**Figure 25**

---

## Stryker MIS Instrumentation

Stryker's streamlined instruments allow a minimally invasive approach for both Posterolateral and Anterolateral surgery that may reduce the amount of soft tissue disruption.

### The Retractor Set

The Retractor Set available for use in minimally invasive hip procedures includes:

- 2 Blunt Narrow Cobra Retractors
- 2 Narrow Hohmann Retractors
- 1 Wide Hohmann Retractor
- 1 Retractor Impactor
- 1 Left and 1 Right Acetabular Retractor
- 1 Femoral Elevator

#### Blunt Narrow Cobra Retractors

(1440-1140)

The Blunt Narrow Cobra Retractor has an increased bend to maximize visualization and a blunt tip design to protect soft tissue.



#### Narrow Hohmann Retractors

(1440-1130S)

The Narrow Hohmann Retractor has a sharp tip that allows for bone fixation. The retractor also has an impaction window for the Retractor Impactor and slots to install the Light Pipe.



### **Wide Hohmann Retractors**

(1440-1135S)

The Wide Hohmann Retractor has an extra wide body to move soft tissue out of the incision area. The sharp tip allows for bone fixation. The retractor has an impaction window for the Retractor Impactor and slots to install the Light Pipe.



### **Retractor Impactor**

(1440-1020)

Additional retractor fixation can be achieved through the use of the Retractor Impactor. Once the retractor is placed within the incision, insert the Retractor Impactor into the impaction window of the appropriate retractor with the Slotted Mallet. Caution must be taken not to break through the superior wall of the acetabulum.



### **Acetabular Retractors**

(1440-1105S/1110S)

An Acetabular Retractor is provided for both the left and right hip. Sharp tips allow for bone fixation. The Retractor includes an impaction window for the Retractor Impactor and slots to install the Light Pipe.



## Femoral Elevator Retractor

(1440-1120)

The Femoral Elevator is designed to elevate the femur out of the incision. It is placed superiorly under the medial aspect of the femur.



## Light Pipe

(1440-1080)

The Stryker Light Pipe provides a low profile, efficient light source allowing excellent visibility of the acetabulum. A sterile, single-use, disposable device, the Light Pipe is composed of a polymer inner core and a metallic outer shield. It is intended for use with the following Minimally Invasive Hip Instrument Retractors with mating slots:

- Narrow Hohmann Retractors
- Wide Hohmann Retractors
- Left/Right Acetabular Retractors

The Surgeon's preference will dictate which Retractor will be used as the light source.

Before clinical use, attach the Light Pipe to the fiber optic cable of the Stryker X6000 Light Source.

### To attach the Light Pipe to a retractor:

Insert the two distal tabs into the retractor slots. Slide the device upwards until the tabs hit the top edge of the slots. Snap the two proximal tabs into the slot on the top surface of the retractor.

### To disassemble:

Reverse the steps above: unsnap the proximal tabs, slide the device downwards, and disengage the two distal tabs.

The device can be pre-assembled to the fiber optic cable when you begin these steps. Please note that when the device is fully threaded onto the cable, one thread will be exposed.



## Femoral Set

The Femoral Set available for use in minimally invasive hip procedures includes:

- Neck Resection Guide
- Alignment Rod
- T-Handle
- Femoral Head Extractor
- Straight Accolade Rasp Handle
- Quick Connect Handle
- Femoral Head Impactor
- Offset Neck Trial Forceps

### Accolade Neck Resection Guide & Alignment Rod

Accolade Neck Resection Guide (1440-1000) / Alignment Rod (1440-1050)

The Accolade Neck Resection Guide Assembly consists of the Neck Resection Guide and the Alignment Rod. It is designed to work with the Accolade TMZF implant system.

To correctly assemble the instrument, place the Alignment Rod through the corresponding left or right hole in the Neck Resection Guide. While holding the Neck Resection Guide Assembly by the handle, place the left or right guide leg on the anterior/posterior aspect of the exposed proximal femur.

The width of each guide leg is 1 cm and can be used as an estimate of distance from the lesser trochanter. The Alignment Rod should be positioned so that it is parallel with the long axis of the femur. Electrocauterization or Methylene Blue can then be used to indicate the neck resection level.



### Straight Accolade Rasp Handle

Straight Accolade Rasp Handle (1440-1400)

The straight design of the Straight Accolade Rasp Handle limits soft tissue impingement. It is designed for the Accolade TMZF Implant Stem system.

The Straight Accolade Rasp Handle locks firmly onto the Accolade Rasps by inserting the post of the Rasp into the corresponding hole on the Rasp Handle and pressing the two together. Care should be taken to align the version post on the Rasp Handle with the positioning slot on the Rasp.



### **Offset Neck Trial Forceps**

(1440-1700)

The Offset Neck Trial Forceps can be used to facilitate placement of the Trial Head/Neck Assembly in a MIS incision.

Clasp the Trial Head/Neck Assembly between the forceps tips and apply pressure until the lock is engaged. The bent end tip of the forceps is pointed up towards the user.



### **Femoral Head Impactor**

(1440-1070)

The Femoral Head Impactor has a slim profile to allow better entry into a reduced MIS incision.



### **Femoral Head Extractor**

(1440-1010) and

**T-Handle**(5900-0050)

The femoral head can be delivered from the incision with the use of the Femoral Head Extractor Assembly that consists of the Femoral Head Extractor and the T-Handle.

Puncture the surface of the femoral head by applying axial force onto the Femoral Head Extractor Assembly. Continue applying axial force to the assembly and begin to rotate the T-Handle in a clockwise direction. Once approximately 50% of the Femoral Head Extractor's threads are engaged, the femoral head can be pulled or levered out of the incision.





---

**Joint Replacements**

---

**Trauma, Extremities & Deformities**

---

**Craniomaxillofacial**

---

**Spine**

---

**Biologics**

---

**Surgical Products**

---

**Neuro & ENT**

---

**Interventional Spine**

---

**Navigation**

---

**Endoscopy**

---

**Communications**

---

**Imaging**

---

**Patient Care & Handling Equipment**

---

**EMS Equipment**

325 Corporate Drive  
Mahwah, NJ 07430  
t: 201 381 5000

[www.stryker.com](http://www.stryker.com)

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

The information presented is intended to demonstrate the breadth of Stryker product offerings. A surgeon must always refer to the package insert, product label and/or instructions for use before using any Stryker product. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Stryker representative if you have questions about the availability of Stryker products in your area.

Stryker Corporation or its divisions or other corporate affiliated entities own, use or have applied for the following trademarks or service marks: Accolade, Stryker, Stryker Orthopaedics, TMZF, Trident. All other trademarks are trademarks of their respective owners or holders.

Literature Number: **LSP49 Rev. 1**  
MS/GS 04/11

Copyright © 2011 Stryker  
Printed in USA

