Optimizing exposure and preserving soft tissue during MIS THA
These minimally invasive hip instruments are specifically designed to accommodate THA through a mini-incision using an anterolateral approach. A slight modification of the standard anterolateral approach, this procedure does not require a full set of new instruments. Innovative retractors supplement existing instrumentation, simplifying the set of tools needed to facilitate a direct approach to the hip, and allowing the assistant to assume a more important role in manipulating the mobile window and positioning the patient.

These minimally invasive instruments have been designed in collaboration with Dr. Gustke and Dr. Jones. We would like to thank Drs. Tischler, Schneeberger, and Steinman for their clinical evaluation of these instruments.
Zimmer MIS
Mini-Incision THA
Anterolateral Approach
Retractor Placement Guide

Instruments and surgical technique
developed in conjunction with:

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Retractor Overview

Fascial Retractor
The concept of the mobile window is essential for minimally invasive surgery. This self-retaining retractor spreads and retracts the fascia without impinging the movement of the mobile window. The fascial retractor features smooth lips around the paddle edges to prevent damage to the soft tissues surrounding the wound.

Anterior Acetabular Retractor
This modified cobra retracts anteriorly by sliding into the interval between the rectus and the anterior capsule, with the tip placed between the anterior acetabulum and the iliopsoas tendon.

Superior Acetabular Retractor
Consisting of three pieces, the superior acetabular wing (available in both left and right); the superior acetabular wing shaft inserter; and the superior acetabular wing shaft, this instrument retracts the capsule, the anterior flap of the vastus lateralis, and the gluteus medius and minimus flaps superiorly and anteriorly. Two pins are driven into the margin of the pelvis, just superior to the acetabulum, penetrating the capsule. The curved wing follows the anterior acetabular rim. After insertion, an assistant detaches the wing shaft inserter, leaving only the small extension in place, freeing the wound space of a cumbersome extra retractor. Removal of the wing shaft facilitates reduction and range of motion/stability assessment. The wing shaft may be used as a measurement landmark, while the attached chain extends from the wing and acts as a retractor tag.
**Posterior Acetabular Retractor**  
Available in two sizes (short and long) to accommodate different sized patients. Designed to be driven into the ischium, this retractor is self-retaining, and retracts the femur posteriorly during acetabular preparation.

**Femoral Neck Elevator**  
This retractor fits between the fascia and the posterior greater trochanter to elevate the femur during femoral preparation.

**T-Handle Ruler, 20mm**  
This convenient osteotomy ruler measures neck length during resection and before reduction. The compact size permits full compatibility with the mobile window.
Procedural Overview

Initial Incision

Initial Exposure

Femoral Resection

Acetabular Preparation & Exposure

Femoral Preparation

Closure
**Initial Incision**

An incision slightly oblique from the longitudinal plane allows for precise and direct access to the acetabulum during acetabular preparation. It also facilitates femoral access without inhibiting the ability to maintain a mini-incision.

**Procedure**

1. Place leg in 30° of flexion in neutral abduction and adduction, and in neutral rotation. Rest the foot on a Mayo stand. The operating surgeon stands on the posterior side of the table, with one assistant standing to the anterior side.

2. Mark and palpate the borders of the greater trochanter and the vastus tubercle.

3. Extend the incision from one fingerbreadth proximal to the posterosuperior border of the trochanter to one fingerbreadth posterior to the junction of the anterior greater trochanter and the vastus tubercle line. The incision length may vary from 8-12cm depending on the size of the greater trochanter. Insert a medium-size sharp rake self-retaining retractor to facilitate exposure.

4. Dissect the soft tissue off of the fascia so that the skin can move independently of the fascia, creating the mobile window.

**Note:** If there is a coxa vara or coxa valga deformity, modify the incision slightly. For coxa vara, shift the incision distally by the distance that the proximal tip of the greater trochanter is proximal to the center of the femoral head. For coxa valga, move the incision proximally.

**Alternate Incision**

A standard straight incision, parallel to the femoral shaft, may also be used. One-third of the incision lies above the trochanteric tip, and two-thirds of the incision falls below the trochanteric tip.
Initial Exposure
**Initial Exposure**

1. Keep the leg in 30° of flexion, and in neutral abduction and rotation. The foot remains on Mayo Stand.
2. Insert the **Fascial Retractor** and remove the superficial self-retaining retractor.
3. Using electrocautery, make an incision longitudinally over the lateral aspect of the greater trochanter. Extend the incision about 1 cm to 1-1/2 cm up in line with the gluteus medius fibers.
4. Leave the thick, tendinous portion of the posterior gluteus medius attached to the greater trochanter. Take care not to go deep into the gluteus minimus.
5. Extend the incision about 1 cm into the vastus lateralis fascia.
6. Using a wide, slightly curved Lambotte osteotome, cut a sliver of bone about 2 cm long, 1 cm wide, and 2 mm deep off of the anterior greater trochanter. This reflects the gluteus minimus and medius together. This sliver of bone allows for a bone-to-bone reduction and reattachment.

**Instruments Used**

A. **Fascial Retractor** - Retains and retracts fascia from the wound without damaging the skin and soft tissue, or impeding movement of the mobile window.

**Alternate Exposure**

1. Using electrocautery, incise the gluteus medius fibers proximal to the trochanteric tip, distal along the trochanteric ridge, and distal along the trochanter, to elevate and separate the medius from the underlying minimus.
2. Tag the medius flap with an interlocking Kessler suture (#5 Ticron) for reattachment to the tendonous cuff along the trochanteric border.
3. Expose the gluteus minimus with a blunt cobra retractor, separating the remaining posterior medius fibers, and incise the minimus and capsule from the superior acetabulum, over the superior neck, along the trochanteric ridge, down into the vastus as a single flap. The insertion at the minimus is 1 cm medial to that of the medius.
4. Continue elevation and exposure along the medial inferior neck to the lesser trochanter. Place a Cobb elevator between the inferior femoral neck and capsule to facilitate exposure.
5. Tag the minimus-capsule flap with an interlocking Kessler suture (#5 Tecron) for reattachment to the anatomic insertion (1 cm medial to the insertion of the medius) using a Hewston suture passer and 3.2 mm drill holes through the trochanter.
6. Continue with initial exposure as follows.
Initial Exposure Continued
Initial Exposure continued

Procedure continued

7. Remove the foot from the Mayo stand and allow the hip to externally rotate.

8. Maintaining the position of the **Fascial Retractor**, insert a medium Meyerding to retract the posterior aspect of the gluteus medius, exposing the interval between the gluteus minimus and piriformis.

9. Open the interval and lift the gluteus minimus off the superior joint capsule with a medium Key elevator.

10. Dissect the anterior vastus lateralis fascia from the anterior vastus lateralis muscle until the vastus intermedialis muscle is exposed.

11. Expose the anterior capsule by elevating the rectus femoralis muscle from the capsule anterior and distal to the vastus tubercle.

12. Insert the tip of the **Anterior Acetabular Retractor** between the anterior acetabulum and the iliopsoas tendon.

13. Finish dissecting the gluteus minimus from the anterosuperior capsule, leaving it attached to the anterior gluteus medius flap.

14. Expose the acetabulum and labrum by retracting the superior capsule and the anterior abductor flap together superiorly with a Meyerding or Hohmann retractor.

**Instruments Used**

A. **Anterior Acetabular Retractor**
   Insert between the rectus and the anterior capsule with the tip in the interval between the anterior acetabulum and the iliopsoas tendon.

B. **Fascial Retractor**
Femoral Resection
Femoral Resection

Procedure

1. Maintaining the placement of the Fascial Retractor and the Anterior Acetabular Retractor, place the Superior Acetabular Retractor (right or left) by inserting the long pin in the margin of the pelvis at twelve o’clock, with the handle straight up and down, just superior to the acetabulum. Position the limb of the retractor along the anterior or posterior acetabular rim, whichever facilitates better exposure. Remove the Superior Acetabular Retractor Wing Shaft Inserter and leave only the Wing Shaft attached. Place the foot on the Mayo stand returning the leg back into neutral rotation.

2. Insert a 3.2mm drill bit vertically to the greater trochanter parallel to the Superior Acetabular Retractor Wing Shaft. The distance between the index mark of the wing shaft and the drill bit will be used to assess leg length.

3. Remove the Fascial Retractor and dislocate the hip anteriorly using a large, blunt bone hook.

4. Adduct, flex, and externally rotate the lower leg, exposing the lesser trochanter for femoral resection.

5. Determine level of femoral neck osteotomy using the 20mm T-handle Ruler.

Instruments Used

A. Superior Acetabular Retractor (right or left) - Retracts the capsule, the anterior flap of the vastus lateralis, and the gluteus medius and minimus flaps superiorly and anteriorly or posteriorly.

B. T-handle Ruler - Measures neck length during resection and before reduction.

C. Fascial Retractor

D. Anterior Acetabular Retractor
Acetabular Preparation and Exposure
Acetabular Exposure and Preparation

Instruments Used

A. Posterior Acetabular Retractor (Long and Short) - Retracts the proximal femur posteriorly for optimal exposure.

B. Superior Acetabular Retractor (right or left)

C. Anterior Acetabular Retractor

Procedure

1. Place the operated leg on top of the contralateral lower leg.

2. Maintaining the placement of the Superior and Anterior Acetabular Retractors, place the tip of the Posterior Acetabular Retractor (Long or Short) through the posterior capsule, behind the labrum, and into the ischium. The sharp tip and striking plate allow the retractor to be easily malleted into place. Once there, it is self-retaining and retracts the femur posteriorly.

3. Move the mobile window to expose the acetabulum and secure with retractors.

4. For acetabular preparation, the operating surgeon now moves to the anterior side of the operating table and the assistant to the posterior side.
Femoral Preparation
**Femoral Preparation**

<table>
<thead>
<tr>
<th>Instruments Used</th>
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<tbody>
<tr>
<td>A. <strong>Femoral Neck Elevator</strong> - Insert between the posterior greater trochanter and posterior fascia in order to expose the proximal femur.</td>
</tr>
<tr>
<td>B. <strong>Posterior Acetabular Retractor (Long and Short)</strong></td>
</tr>
<tr>
<td>C. <strong>Superior Acetabular Retractor (right or left)</strong></td>
</tr>
</tbody>
</table>

**Procedure**

1. The operating surgeon moves back to the posterior side of the table and the assistant moves to the anterior side.

2. Remove the **Wing Shaft** on the **Superior Acetabular Retractor** and remove the **Posterior Acetabular Retractor**.

3. Place the **Femoral Neck Elevator** between the posterior greater trochanter and posterior fascia for broaching, and maximally externally rotate the leg.

4. Adduct and flex the lower leg. The combination of an assistant pushing on the knee with his or her body and the femoral elevator should raise the proximal femur to the mobile window. Maximally rotate the leg externally for the greatest exposure.

5. Place the leg perpendicular to the floor to confirm broach rotation. The leg may be kept in maximum external rotation to eliminate any skin impingement during broaching.

6. With the leg maximally externally rotated, plane the calcar. Confirm the neck length using neck and head trials.

7. Remove the **Femoral Neck Elevator** and reduce the hip.

8. Attach the **Wing Shaft** to the **Superior Acetabular Retractor**. Place the foot on the Mayo stand, and insert the 3.2mm drill bit into the previously made hole in the greater trochanter. The drill bit and the **Wing Shaft** should be parallel.

9. Check the leg length by measuring the distance between the **Superior Acetabular Wing Shaft** and the drill bit in the femur.

10. Remove the **Superior Acetabular Retractor Wing Shaft**. Re-dislocate the hip to remove the trial head and neck. Use electrocautery to mark the mid-rotation point of the broach on the inferior neck.

11. Insert **Femoral Neck Elevator** between the posterior greater trochanter and posterior fascia, maximally externally rotating the leg.

12. Insert the femoral component aligning the midpoint of the inferior component with the electrocautery mark on the inferior neck. Once the implant is about two-thirds seated, place the lower leg in neutral rotation, perpendicular to the floor, and ask the assistant to release upward pressure on the femur bringing the femoral neck under the superior skin edge.

13. Remove the **Femoral Neck Elevator** when the implant is fully seated, and reduce the hip.
**Closure**

**Procedure**

1. Remove all retractors from the wound.
2. Reinsert the **Fascial Retractor**.
3. Extend and externally rotate the leg to repair and close the capsule.
4. Place the foot on a Mayo stand to reduce the anterior gluteus medius, anterior vastus lateralis, and gluteus minimus flap to its anatomic position using the bone sliver as a guide. Repair through bone with #5 permanent suture.
5. Remove the **Fascial Retractor** and close the fascia, subcutaneous tissue, and skin.

**Alternate Closure**

1. Remove all retractors from the wound.
2. Reinsert the **Fascial Retractor**.
3. Abduct the hip on a “bump” (padded, inverted splash basin).
4. Reattach the gluteus minimus-capsule flap to the anatomic insertion through the trochanter, 1cm medial to the gluteus medius insertion, using a Hewston suture passer and 3.2mm drill holes. Internally rotate the hip during suture to facilitate reduction. Excoriate the underlying trochanteric bone to enhance attachment.
5. Reattach the gluteus medius flap to the tendinous cuff of the insertion along the trochanteric border.

**Ordering Information**

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<th>THA ANTEROLATERAL APPROACH INSTRUMENTS</th>
<th>Catalog No.</th>
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Clinical Results*

Synopsis:
Minimally invasive THA is an excellent option to enhance patient recovery experiences by decreasing muscle and tissue damage, improving psychological benefits for the patient due to smaller incisions, and reducing the need for additional operating room personnel.

Minimally Invasive THA Through an Anterolateral Approach:
Optimal muscle function postoperatively is achieved by minimizing muscle and soft tissue damage during surgery. A smaller incision, or mini-incision, reduces the length of muscle that is incised, divided, or released in order to provide femoral and acetabular access. Innovative instruments, designed precisely for an MIS anterolateral approach, combined with leg positioning, facilitate access without the need for a larger incision. With specifically designed instruments and surgical techniques, most patients may benefit from an 8-12cm incision.

Clinical Study
Data is reported on the first MIS Anterolateral Approach hips (57) versus a like-set of non-MIS hips (53).

*Unpublished data

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<thead>
<tr>
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Please refer to package insert for complete product information, including contraindications, warnings, precautions, and adverse effects.