Minimally Invasive Hip Replacement through the Direct Lateral Approach
Introduction

Prosthetic replacement of the hip joint is universally accepted as one of the most important advances in orthopaedic surgery. Results have been spectacular and complications few as the benefits of this procedure have been successfully extended to both the very young and the very old. Advancements in materials and better understanding of failure modes have gradually lead to improvement in the lifespan of total hip replacement implants.

Minimally invasive surgery represents a natural progression in total hip replacement surgery. With minimally invasive surgery has come the prospect of less pain, a shorter hospital stay and quicker recovery. These claims are directly related to the distinct surgical techniques associated with minimally invasive surgery. Less surgical dissection, reduced retraction of tissue and limited cutting of muscle can set the stage for faster rehabilitation. It is important to recognize that minimally invasive surgery represents more than "minimal incision surgery" and that adherence to minimally invasive surgical techniques will result in less surgical morbidity and improved patient satisfaction.

Minimally invasive total hip replacement surgery has been performed through differing surgical approaches. Each has its unique advantages and disadvantages which are not unlike those associated with these approaches in standard non minimally invasive surgery.

Some minimally invasive surgery approaches have the potential for even greater morbidity than is associated with traditional total hip replacement due to insufficient visualization of the femur. Of particular concern is the inability to properly implant a stable prosthesis and the risk of fracturing the femur.

Minimally invasive total hip replacement performed through a direct lateral approach offers all of the advantages of minimally invasive surgical technique without the added morbidity associated with some minimally invasive surgery approaches. Using the Incision Locator pictured in this technique, the incision can be accurately placed without fluoroscopy for a trans-gluteal approach to the hip joint that can permit limited soft tissue dissection and yet afford excellent visualization of the femur and acetabulum. Since the posterior hip joint capsule is left intact, joint stability is improved and dislocation rates are lower than for most total hip replacement approaches. The proximal femur is directly visualized ensuring that proper implantation of the femoral stem is not compromised. Acetabular exposure is obtained through the same incision and from an anterior perspective which makes achieving stable component orientation less problematic.

The minimally invasive direct lateral approach is a low morbidity alternative to other surgical approaches for total hip replacement. It is technically easy to master and offers the advantages of less pain, faster recovery and improved joint stability.

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Patient Preparation

Determination of Leg Length

Determine leg length measurement radiographically through X-ray templating. This determination is then checked clinically (figures 1-3).
Patient Positioning

Position the lateral decubitus using a pelvic positioning/stabilizing table attachment. Ideal patient position is anterior on the operating table, which allows for a more vertical position of the femur once the hip is dislocated. A vertical femur will facilitate proximal femoral exposure and limit trauma to the abductor muscles (figures 4 and 5).
Surgical Technique

Incision Planning

Use the Incision Locator developed for the direct lateral approach and pictured in figure 6 to accurately position the initial skin incision directly over the hip joint. The Incision Locator uses the longitudinal axis of the femur and the tip of the greater trochanter as anatomic landmarks for making the incision (figures 6-10).
Skin Incision and Exposure

Keep the incision proximal and anterior to the greater trochanter to center it directly over the hip joint.

The incision is straight and of varying length depending on the Body Mass Index (BMI) and depth of subcutaneous tissue. A rough gauge of incision length can be calculated by doubling the skin to trochanter depth as measured from a magnification marker on pre-operative radiographs.

After marking and making the skin incision, incise the gluteus fascia in line with the incision. A Hawkins – Bell shoulder U retractor can temporarily be inserted to facilitate exposure of the abductor muscles (figure 9).

The direct lateral approach is then marked by measuring 1 cm from the posterior border of the gluteus medius for the incision into the gluteus medius tendon. Then connect this point to the vastus lateralis tendon at its insertion point into the vastus lateralis tubercle and carry 1 cm into that tendon (figure 10-11).
Skin Incision and Exposure

Carry the incision into the gluteus medius tendon 1 cm into that tendon to expose the gluteus minimus beneath. Then incise that muscle along its posterior border and carry the incision deep through the hip joint capsule and proximally through the acetabular labrum.

Place Hohmann retractor anterior to the femoral neck and use it to help elevate the anterior capsule along with the gluteus minimus tendon off of the anterior femur (figures 12a & 12b).

Tip: Elevate “myofacial sleeve” composed of gluteus medius, minimus, hip joint capsule and vastus lateralis off of the trochanter and anterior femur.
Dislocation

Place a bone hook around the anterior femoral neck. As the surgeon lifts with the bone hook, the assistant gently performs a maneuver of flexion, adduction over the fulcrum of the anterior edge of the table along with external rotation of the leg (figures 13a-13d).

**Tip:** In the event that the hip does not easily dislocate, inspection must be made to remove osteophytes or release a tight hip joint capsule in order to prevent fracture. On rare occasions, the femoral neck will need to be osteotimized and the femoral head removed separately.

**Tip:** Hip dislocation is facilitated by removing all self-retaining retractors after the bone hook is placed around the femoral neck. This relaxes the soft tissue envelope and makes dislocation easier and less traumatic to the soft tissues.
Surgical Technique

Femoral Preparation

Place thin narrow Hohmann retractor anterior to both the femoral neck and anterior wall of the acetabulum. Leverage on this retractor will adequately expose the anterior femoral neck for osteotomy. Place Charnley pin retractor into the trochanter and use a right angle retractor to further enhance exposure and protect the skin (figures 14a-14c).

The femoral neck is osteotomized with a sagittal saw and the femoral head is removed.

Synovial adhesions to the posterior femoral head and neck will frequently need to be released as the head is removed in retrograde fashion using a bone holding forcep.
Femoral Preparation (continued)

Replace the Hohmann retractor with a medium Deaver retractor anterior to the proximal femur. Reposition the Charnley pin retractor to facilitate exposure of the proximal femur. Use a thin malleable retractor to protect the soft tissues as femoral reamers and broaches are used to prepare the femur (figures 15-17).
Acetabular Preparation

Exposure for acetabular preparation is made with a Homann retractor placed anterior and parallel to the anterior wall of the acetabulum. Then place Charnley pin retractors superior into the ileum and posterior into the ischium to expose the acetabulum (figures 18-20).

Remove the acetabular labrum and osteophytes taking care not to disturb the posterior capsule.

Tip: A fundamental principle of acetabular preparation is to ream a hemisphere and not a direction! Reaming in the direction of the intended cup position will tend to create an elliptical acetabulum instead of a hemisphere. This is due to the vector applied to the reaming device by all of the tissues but principally by the femur.
Closure

Complete the direct lateral approach anatomically and in layers.

Advance the anterior hip joint capsule along with the gluteus minimus slightly through strategic placement of sutures. To allow repair to the tendon cuff of the gluteus medius, (figures 21 & 22) suture the remainder of the “myofacial sleeve” anatomically in place paying particular attention to the anchoring points of the gluteus medius tendon, the piriformis tendon and the vastus lateralis tendon.
Surgical Technique

Rehabilitation Protocol

There is generally no need for an abduction pillow following exposure through a direct lateral approach. Patients are encouraged to begin transfers out of bed on the day of surgery and to begin formal gait training with partial weight bearing on the day of or the day after surgery. Discharge from the hospital can occur on the day of surgery in selected patients when same day physical therapy and home health care support is available. Other patients can be discharged 1-3 days earlier than with standard non minimally invasive total hip replacement surgery patients.

Crutch or walker-protected ambulation continues for the first 3 weeks followed by full weight bearing with a cane for an additional 2-3 weeks. Driving is usually permitted in 3 weeks along with the transition to a cane.