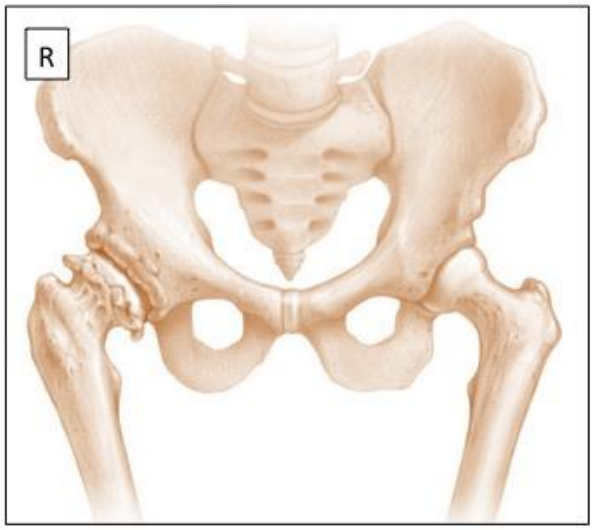
Anterior Approach: Total Hip Replacement

Optimizing outcomes. Accelerating recovery.

What is Hip Arthritis?

The hip is a ball and socket joint comprising the femoral head (ball) and acetabulum (socket). The bearing surfaces of the femoral head and acetabulum are covered by hyaline cartilage, which forms a very low friction surface allowing free and painless motion

Figure 1: The Normal Hip and the Arthritic Hip



The left hip is a normal hip. The right hip illustration demonstrates arthritis.

The x-ray demonstrates osteoarthritis of the right hip.

Hip arthritis is a disease that involves the degeneration and loss of the cartilage surface leading to bone-on-bone contact between the femoral head and acetabulum. The patient develops pain, loss of hip motion and impairment of activities. Total hip replacement is a definitive and effective treatment for hip arthritis.

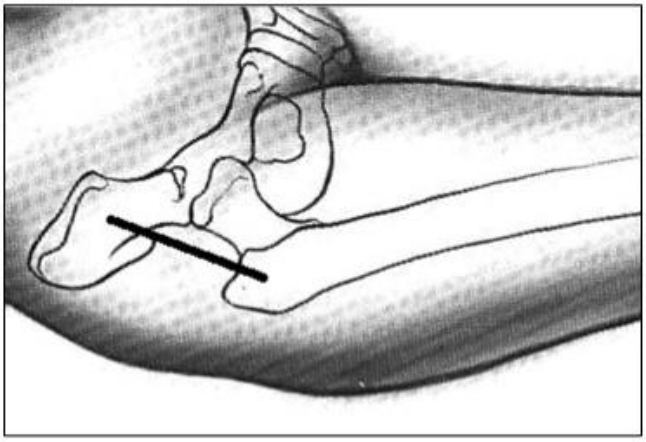
Why the anterior approach for total hip replacement?

The "anterior approach" indicates a surgical exposure of the hip from the front of the body ("anterior"), rather than from the side ("lateral") or through the buttocks ("posterior"). The popularity of the anterior approach for total hip replacement is rapidly growing because of its definite advantages for patients. Rehabilitation is simplified and accelerated, dislocation risk is reduced, leg length is more accurately controlled and the incision is small.

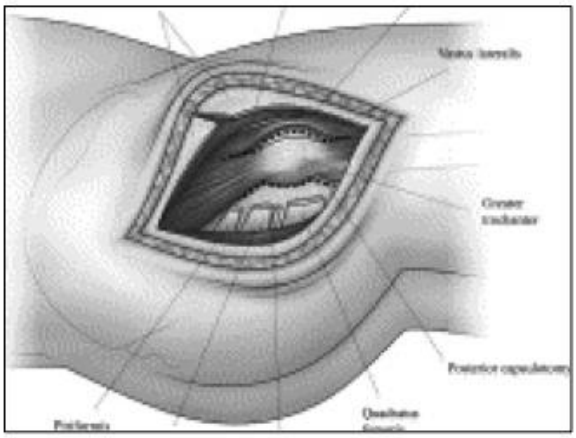
- The anterior exposure/approach allows the surgeon to replace the arthritic hip through naturally occurring intervals between the hip muscles without cutting through or detaching muscles from the hip and pelvis (as required in other surgical exposures to the hip).
- When performed from the anterior approach, the replaced hip is inherently stable, decreasing the risk of hip dislocation.
- After the anterior approach surgery, there are no limitations or restrictions on post-operative motion. Thus, patients are encouraged to walk and move their hip freely, simplifying rehabilitation and accelerating recovery.
- The anterior approach preserves the muscles, minimizing problems with weakness and limping and also limiting the pain associated with surgery.
- The surgical technique allows the surgeon to more accurately place the prosthetic components and the normal anatomy and leg lengths can be controlled precisely.

Anterior approach hip replacement surgery was first performed in Paris, France by Professor Robert Judet in the year 1947. This approach allows access to the hip joint from the front ("anteriorly") as opposed to a lateral (side) approach to the hip or posterior (back) approach. Professor Judet's reason for approaching the hip anteriorly was that the hip is closer to the front of the body than to the back, thus less tissue must be traumatized to access the joint from an anterior approach. Further, he felt the anterior approach "respects" the hip muscles and nerves, as the surgeon can expose the hip socket working through natural intervals between muscles, rather than cutting through these structures as required by other approaches. This, he thought, would preserve the intrinsic stability and function of the hip and limit the probability of muscle weakness and prosthesis dislocation.

Figure 2: The anterior approach vs the posterior approach to the hip.



The anterior approach allows the patient exposure to the hip through the natural interval between muscles, without cutting through any muscles.



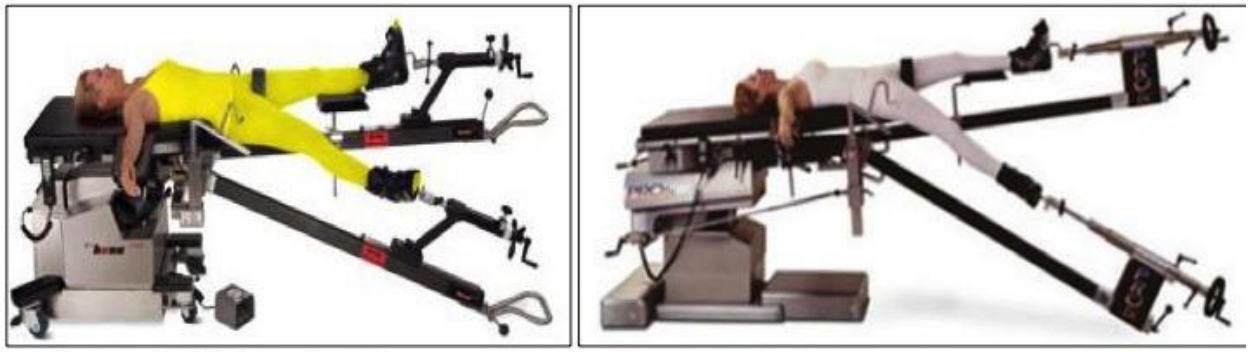
The posterior and lateral surgical exposures require dissection through muscles, which has ramifications on weakness and hip stability

The hip socket is very stable anteriorly, and it is difficult to get the femur out of the socket to allow the surgeon access to place the femoral sided component. Professor Judet designed an orthopaedic table utilized for other hip surgeries and he found that the use of this table greatly enhanced the surgeon's ability to access the hip without damaging muscles through the anterior incision. The availability of the table made this beneficial method of hip replacement the preferred option for total hip surgery at this hospital in France where it has been utilized ever since.

Hip replacement performed from the anterior approach gained favor for its inherent stability and low dislocation rates, as well as faster patient rehabilitation associated with preservation of the hip muscles.

Why, then, is the anterior approach **less common** than other approaches in the United States? There are several reasons: lack of familiarity with the anatomy and technique, traditional teachings in training programs and lack of access to the specialized instrumentation and equipment needed to perform anterior approach. Furthermore, most North American surgeons did not have access to a specialized orthopaedic table (like the French Judet Tesserit® table) to facilitate the anterior approach. Fortunately, popularity of the anterior approach has dramatically increased over the last decade in the United States. This change is largely due to advancements in surgeon educational programs, equipment and tools designed specifically to aid anterior approach surgery, and the availability of specialized orthopaedic tables (OSI Miszoki HANA® and PRO-Fx® tables).

Figure 3: The specialized orthopaedic tables utilized by surgeons to facilitate anterior approach THA.



The HANA® table (Mizuho OSI)

The PRO-Fx® table (Mizuho OSI)

This approach is a direct anterior approach, utilizing the vertical portion of the Smith-Peterson muscular interval. Other surgical approaches (the lateral approach and posterior approaches) necessitate detachment of the hip stabilizing muscles (particularly the gluteus and the posterior rotators) from the femur during surgery. In the anterior approach, by contrast, the hip is approached and replaced through a natural interval between muscles and the muscles for hip function and stability are left intact. The accelerated rehabilitation and short hospital stays associated with the anterior approach have been attributed to the muscle sparring nature of the exposure.

Due to the inherent stability and preservation of the muscles, there are no post-surgical "precautions" or motion limitations after anterior approach THA. After lateral or posterior approaches for arthroplasty, patients

are commonly instructed to follow strict precautions that limit hip motion after surgery. For example, patients are instructed to limit hip flexion to no more than 90 degrees and avoid turning their knee inward. These limitations complicate a patient's simple daily activities such as sitting in a chair or on the toilet or getting into a car. However, because no muscles are detached from the hip or pelvis during an anterior approach hip replacement, there is inherent stability of the hip replacement and a very low risk of dislocation. Thus, patients are immediately allowed to bend their hip freely without any limitations and avoid these cumbersome restrictions. They are instructed to use their hip and can get up and get going far quicker than traditional approaches. This benefit of the anterior approach has also been associated with accelerated rehabilitation and shorter hospitalization.

With the anterior approach the patient lies supine (on their back) during surgery. X-rays (with a fluoroscopy machine) are taken during surgery ensuring correct position, sizing, and fit of the artificial hip components as well as correct leg lengths. This practice of fluoroscopic navigation is associated with precise restoration of a patient's optimal hip anatomy, leg length and pelvic mechanics.

The anterior approach does not limit the patient's and surgeon's options regarding type of hip prosthesis. Hip prostheses that are implanted with or without cement are applicable, as are any of the modern bearing surfaces.

To summarize, the anterior approach arthroplasty procedure is a long-standing approach to total hip replacement, dating back to 1947. Patients benefit from the low risk of hip dislocation, faster and simplified rehabilitation, a short incision and accurate restoration of leg length and mechanical anatomy. This technique is associated with a very low complication rate, shorter hospital stays and less post-surgical pain than other hip exposures. Simply put, patients return to their lives more quickly than "traditional" arthroplasty techniques with excellent short- and long-term outcomes.

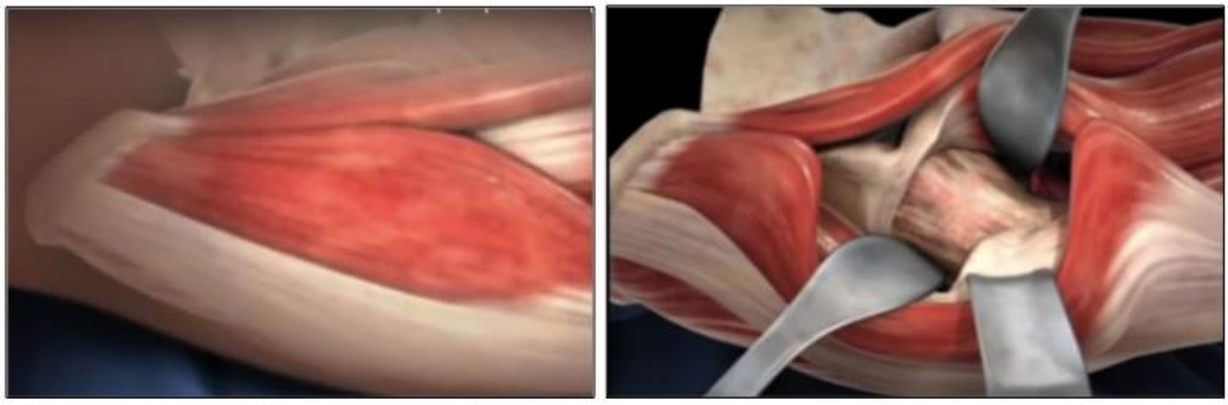
The Operating Room Experience

After meeting the surgical team in the pre-operative room, the patient is taken to the Orthopaedic operating suite. Following anesthesia (most commonly a spinal anesthetic), the patient is placed supine on the HANA or PRO-fx table. The unique capabilities of the table facilitate surgery through this smaller, muscle sparing approach. Patients are secured to the table via boots (much like ski boots) strapped to their legs, and there is a robotic arm that allows attachment of tools that can lift the femur bone away from the pelvis to enhance the preparation of the femur later in the surgery (See Figure 2 above).

The Anterior Approach

The hip is exposed by following a natural plane between muscles and nerves, without detachment of muscle or tendons from the bone. The femoral neck is cut, and the arthritic femoral head and neck are removed.

Figure 4: The Anterior Approach



This drawing depicts the anterior musculature originating from pelvis bone and covering the hip socket.

With the anterior approach, the hip is accessed by spreading the muscles with retractors, rather than cutting through or detaching them from the hip.

Acetabular Preparation

The arthritic acetabulum undergoes a procedure called reaming. A hemispherical shaped reamer (which looks like a round cheese grater) rotates on the end of a shaft. Reamers of gradually increasing diameter accurately shape the bone of the acetabulum to accept the acetabular prosthesis. An acetabular prosthetic component slightly larger in diameter than the prepared acetabular cavity is inserted with a “press” fit that produces initial stability.

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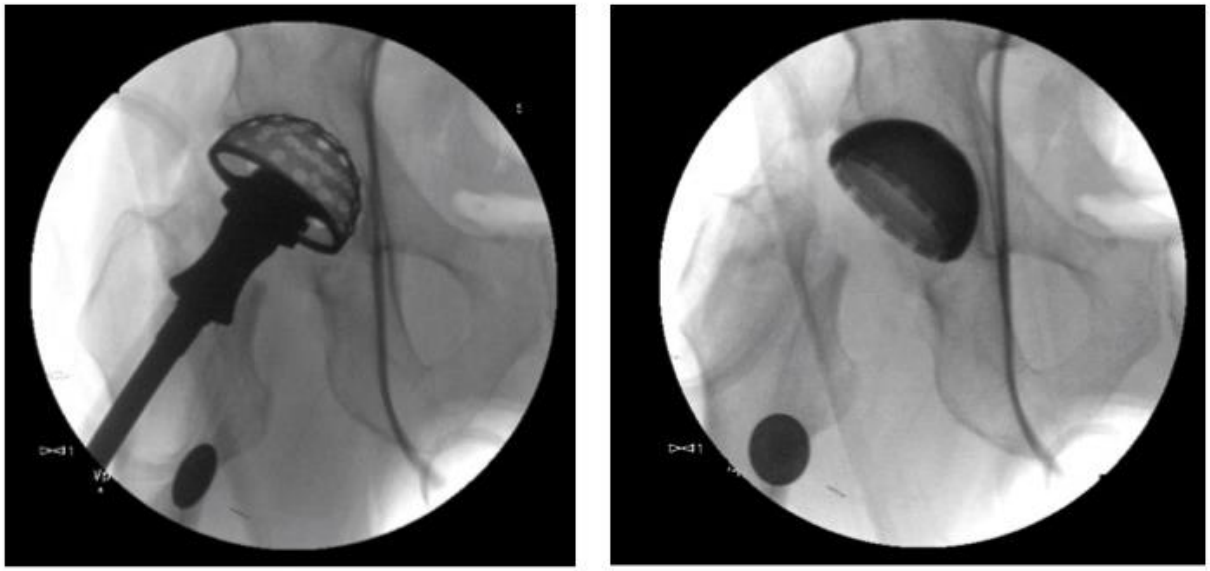
Figure 5: The Acetabulum

Acetabulum (socket) exposure | Acetabular reaming | Acetabular component placement

During insertion, active X-ray control with the fluoroscope is used to position the prosthesis accurately.

Figure 6: Fluoroscopy of the acetabular component



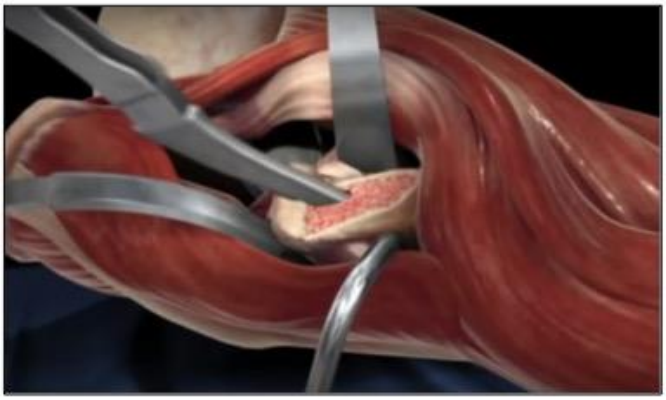
Acetabular reaming is performed with radiographic navigation.

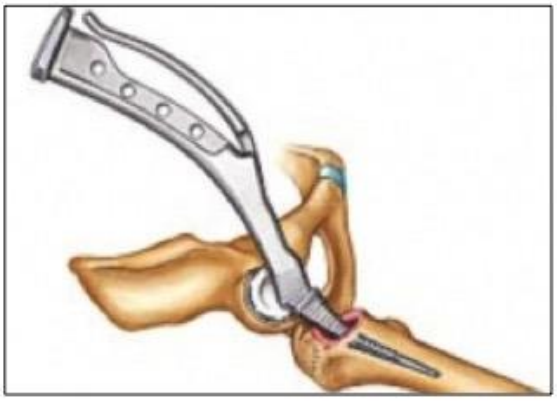
The acetabular component is then placed with the x-ray to ensure accurate position.

Femoral Preparation

The table rotates the leg externally (foot pointed outward) and extends the hip, dropping the foot towards the floor to allow femoral access through this small approach. A broach is inserted into the femoral canal. Progressively larger broaches are then inserted. The broach size is limited by the hard outer cortical bone.

Figure 6: The femur

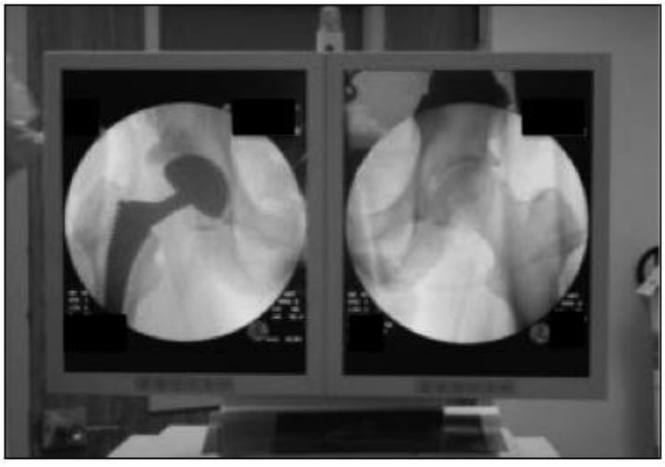




The femur is exposed through the same incision and muscular interval, and broaching is performed with the leg held in position by the orthopaedic table.

Sizing

Following insertion of the final broach, the driving handle is removed. The broach is temporarily left in as a "trial" femoral prosthesis and its upper end is capped with a trial femoral head. The table repositions the leg to its normal position and the trial head is "reduced" into the acetabulum. X-ray control is now used for sizing. Side by side television monitors compare the X-ray image of the patient's opposite hip to the operated hip. This comparison gives immediate information regarding equality of leg length and femoral offset (horizontal distance of the femur from the pelvis). If the initial trial shows undesirable leg length, offset or stability, adjustments are made



The Femoral Prosthesis

A femoral prosthesis of specific size is accurately inserted to reproduce the sizing indicated by the trial phase. The prosthetic hip is reduced by moving the leg into its normal position as the femoral head is placed into the acetabulum. The wound is washed with antibiotic solution and closed.

The Post-Operative Experience

Baring complications, our patients start unrestricted weight-bearing with expert physical therapists within hours of their surgery. They may utilize an assistive walking device (cane, crutch or walker) as needed on an individual basis. Most patients use some type of assistive device for about 10 days post-operatively. They will learn to navigate stairs and get in and out of a simulated car. There is no need for special toilet seats, braces or restrictive pillows. Often this is accomplished within about 4 hours of the operation!

Pain is controlled with a highly specialized multimodal analgesia regimen based primarily on non-narcotic medications. The regimen is tailored to each individual based on pre-existing medical conditions. This medication regimen is designed to appropriately address pain while limiting the side effects associated with narcotic based medications, like constipation and urinary retention. Many patients do not utilize any narcotic or "opioid" medications after surgery and rely solely on the anti-inflammatory and Tylenol medicines. We recommend a "Game Ready" cold compression device that has greatly decreased the amount of pain and swelling after aTHA (we will discuss this at your appointment).

The incision is closed with a plastic surgical closure without any staples or sutures to be removed. It is coated then with a glue that seals the wound. A water tight dressing is applied and is removed at home 7 days after surgery.

The majority of our patients either leave the hospital on the day of surgery ("FastTrack") or spend one night in the hospital. For more information about the "Fast Track" program, refer to Dr. Ferguson's website: taniaferguson.com.