Anterior Approach in Total Hip Replacement

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Abstract: In total hip replacement, the anterior approach is intermuscular and internervous and allows the surgeon to reach the capsule without muscle detachment. Advantages include faster recovery and excellent functional outcome as well as reduced postoperative pain and hospital stay. Experienced surgeons currently performing total hip replacement should be aware of all of the difficulties associated with this procedure as well as all of the tricks to overcome the most challenging steps in order to reduce complications during the learning curve. The authors present the most crucial steps in total hip replacement through the anterior approach and describe the potential pitfalls and solutions. [Orthopedics. 2017; 40(3):e553-e556.]

The anterior approach is intermuscular and internervous and allows surgeons to reach the hip joint capsule without muscle detachment through the muscular interval between the sartorius and rectus femoris medially (innervated by the femoral nerve) and the tensor fascia lata laterally (superior gluteal nerve) (Figure 1).

The anterior approach is gaining popularity,1,2 most likely because of the perception of a faster recovery, reduced risk of dislocation, good functional results, and early return to strenuous activities.3 However, several studies have reported a higher complication rate for the anterior approach, compared with other approaches, as a consequence of the learning curve.4-7 This article reports the most crucial steps in total hip replacement (THR) through the anterior approach and describes the potential pitfalls and solutions.

Surgical Technique

Patient selection is crucial during the learning curve. Although the anterior approach can be performed for all patients, the ideal candidate is a tall woman who is not too muscular. The longer lever arm of the femoral shaft enhances femoral exposition. A rather valgus hip or a long femoral neck allows easier femoral osteotomy, while mild arthritis without pelvic complications facilitates femoral head removal. The anterior approach can be performed using a leg positioner, which requires fewer members of the surgical team and allows direct control of leg movements (Figure 2) (Video).

The incision (Figure 3) should be approximately 10 cm; longer incisions do not improve visualization. A mini-incision or a bikini-like incision is also possible.9 Remaining lateral to the anterior superior iliac spine avoids damage to the lateral femoral cutaneous nerve that runs medially.

The sheath of the tensor fascia lata is incised longitudinally at a slight slant downward and outward. The intermuscular interval between the tensor fascia lata and the sartorius can be identified by smooth dissection and widened using a special Beckmann retractor to reveal...
The aponeurosis of the rectus femoris. This is incised longitudinally and the muscle body is retracted medially. Usually, the circumflex pedicle can be detected and ligated between the distal and the middle third of the approach (Figure 4).

The anterior capsule of the hip joint can be exposed by removing the fat pad.

Capsular preservation is important for stability. Therefore, it is advisable to preserve the capsule and suture it at the end of surgery (Figure 5).

The femoral neck osteotomy (Figure 6) is not completed with the saw. The posterior cortex is left intact. Some traction is applied, thus allowing the osteotomy to slightly open. The femur is externally rotated at 45° to break the posterior cortex.

The femoral head is removed with a corkscrew. If this procedure proves complex, it may be useful to perform a double osteotomy of the neck to obtain a wider operating space.

A modified Charnley retractor is placed inside the capsule below and above the femoral neck. The osteotomy level is identified by palpating the pretrochanteric tubercle. The intertrochanteric line (blue) suggests the direction of the osteotomy, 1 cm proximal to the lesser trochanter.

The hip is hyperextended using the leg positioner; traction is automatically released in order not to stretch the femoral nerve. Once the hip has been hyperextended, if femo-
General exposure is not satisfactory, the hip is returned to the neutral position and the maneuver is restarted from the beginning. The adduction of the leg positioner below the contralateral leg facilitates broach insertion. For very muscular patients, excessive adduction increases tensor fascia lata tension, which may finally result in a reduced operating space.

During femoral broaching, the position of the traction boot should not be trusted because there is a wide discrepancy between the external rotation of the foot and that obtained at the knee. The patella is palpated to confirm 90° of external rotation. A dedicated curve handle designed for the anterior approach must be used for broaching the femur.

To avoid leg-length discrepancy, a few tricks must be adopted (Figures 9–10). Leg length can also be assessed by fluoroscopy, which is not prevented when using a traction table. Reduction is performed through a series of steps. First, the adduction is removed and the hip is elevated until slightly flexed. With traction applied, the femur is internally rotated to perform the reduction. Once reduction is achieved, the traction is released. The stability of the THR can be checked via the anti-dislocation test with the hip dislocated. A second failure test permits preservation of all muscular insertions. Therefore, only fascia, subcutaneous tissue, and skin must be closed.

**Materials and Methods**

The authors performed 90 THRs via the anterior approach from April 2009 to February 2013. An anterior minimally invasive surgery leg positioner (AMIS; Medacta International, Castel San Pietro, Switzerland) was used in all cases. All of the patients received a short, straight, hydroxyapatite-coated stem (AMIS Stem; Medacta International), a hemispherical hydroxyapatite-coated cup (Versafixcup CC; Medacta International), and a ceramic-on-ceramic coupling (Biology delta; CeramTec GmbH, Plochingen, Germany). For the purpose of this study, patients were recalled for clinical and radiologic assessment.

**Results**

No patient was lost to follow-up. Average Harris Hip Score was 90 at latest follow-up, confirming an excellent clinical outcome. One patient had an intraoperative undisplaced fracture of the greater trochanter. Seven patients reported a smooth meralgia paraesthetica (burning and/or numbness sensation) that did not interfere with activities of daily living. In 1 patient, signs of implant loosening were observed around the femoral stem, which was revised 2 years after implantation. This patient had a 1.5-cm leg-length discrepancy (contralateral side longer than the operated on side). A second failure was recorded; the acetabular component was revised a few days after surgery because of hip dislocation.

**Discussion**

Advantages of the anterior approach for THR include minimal soft tissue dissection with no muscle detachment, a low dislocation rate, and reduced consumption of pain medication ultimately resulting in a shorter hospital stay and faster functional recovery. The authors believe that these advantages are at least partly the result of the minimally invasive nature of this approach, which keeps soft tissue trauma to a minimum and leads to faster postoperative mobilization and rehabilitation. In addition, as greater interest in smaller incisions has been generated by cosmetic concerns, this approach offers a short incision that can be further cosmetically improved with a bikini-like incision. The major concern about the anterior approach relates to the high number of complications reported, particularly during the surgeon’s learning curve, leading to a higher revision rate. In a series of more than 5000 THRs through the anterior approach, the cumulative revision rate at 4 years was 3%. Revision rate is strongly influenced by surgeon experience, with rates of 6% and 2% reported for surgeons who performed fewer than 15 or more than 100 procedures, respectively. The main diagnoses leading to revision, in order of frequency, are reported to be femoral fracture, loosening/lysis, prosthetic disloca-
tion, infection, and leg-length discrepancy. Nevertheless, a short stem with a smoother shoulder could be useful for avoiding femoral fractures.

A specific drawback of the anterior approach is the possible injury to the lateral femoral cutaneous nerve, even if this rarely leads to functional limitations. During skin incision, to minimize the odds of nerve damage, the surgeon must remain 1 inch lateral to the anterosuperior iliac spine. In an anatomical study, the lateral femoral cutaneous nerve branched before traversing the inguinal ligament in 27.6% of cases. If a patient has this anatomical feature, complete nerve preservation is almost impossible.

Another limitation of the anterior approach performed with the aid of a traction table is difficulty with intraoperative leg-length assessment. This may be overcome following the authors’ suggestions.

**CONCLUSION**

In the authors’ experience, the anterior approach provides an excellent functional outcome with a low rate of complications and thus may ultimately result in an overall reduction in costs. Even among experienced surgeons, a change in surgical approach may lead to a different outcome. To reduce the learning curve, the authors suggest specific training and proper education in either cadaver laboratories or reference centers. To overcome the most common difficulties encountered during the anterior approach for THR, reduce complications, and achieve a satisfactory clinical result, the steps of the surgical technique must be followed.

**REFERENCES**


