

Technique of

Single Incision Minimally Invasive Total Hip Replacement Surgery to Reduce Soft Tissue Trauma

By S. David Stulberg, MD

The Proximal Posterior Exposure of the Hip Joint: A reduction in deep soft tissue trauma to facilitate single incision minimally invasive total hip replacement surgery

Although the original reports on MIS THR focused on the cosmetic benefits of shortened surgical incisions, current investigations are beginning to emphasize the potential functional benefits and reduction in morbidity that might be associated with these exposures. The development of the exposure described here was stimulated by the desire to reduce the deep soft-tissue trauma produced by a typical single incision posterior-lateral exposure of the hip joint during THR surgery. It is the author's belief that it will be the minimization of deep soft tissue trauma, not the length of the skin incision, which will be associated with a decrease in morbidity and more rapid recovery of function.

The proximal-posterior exposure embodies four modifications to the standard posterior-lateral approach for the performance of a THR: 1) minimal incision of the tensor-fascia lata; 2) release of only the piriformis and superior gemellus short-external rotator tendons; 3) in-situ osteotomy of the femoral neck and manual removal of the femoral head; and 4) minimal or no incision or release of the inferior and anterior hip joint capsule. These portions of the exposure are, therefore, described in detail.

INCISION

The skin incision is based at the tip of the greater trochanter and extends proximally along the posterior border of the gluteus medius and distally to the base of the greater trochanter. Approximately 2/3 of the incision is proximal to the tip of the trochanter.

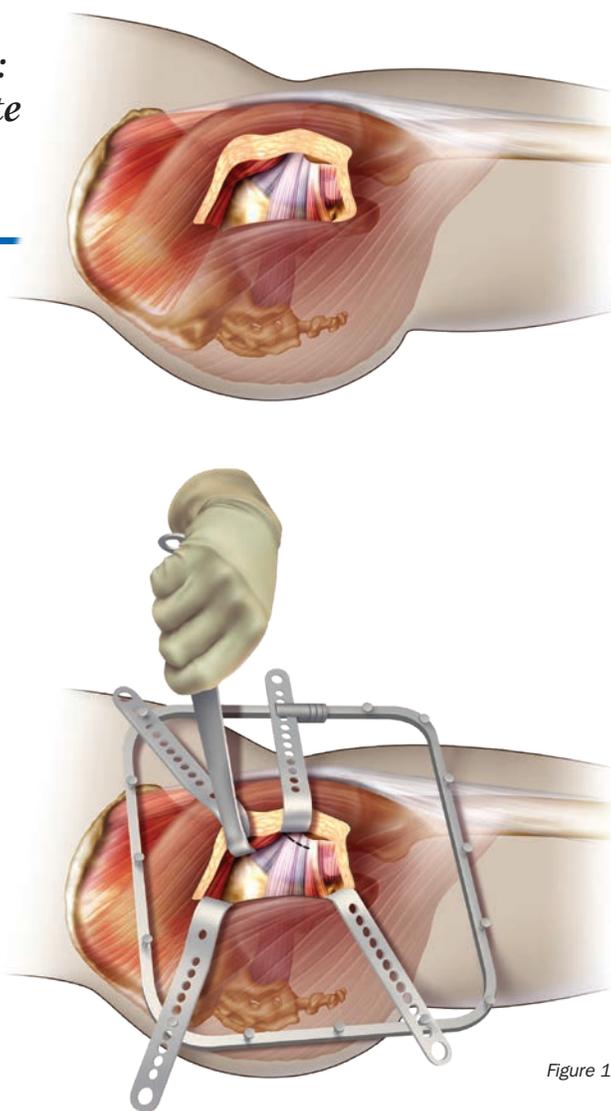


Figure 1

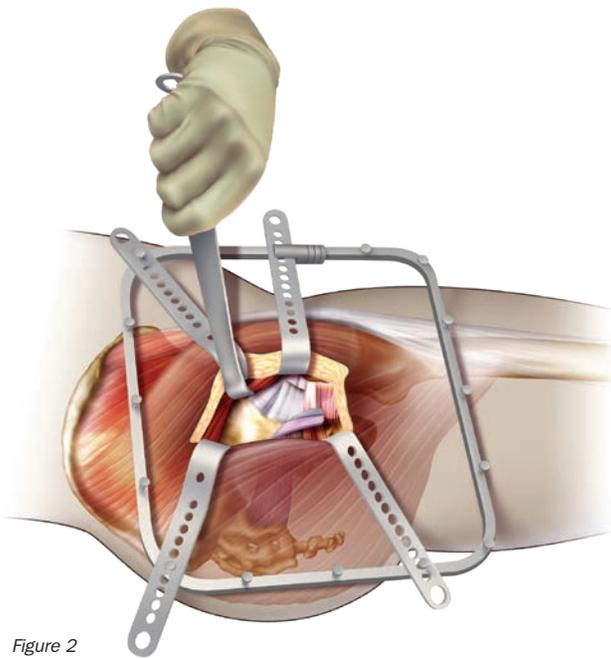


Figure 2

The thin fascia overlying the gluteous maximus is incised and the muscle split in the line of its fibers at the posterior border of the gluteus medius. The tendon of the fascia lata is incised just enough to allow a finger to be placed under the tensor fascia. This allows the gluteous maximus to be bluntly mobilized. A *self retaining retractor* ④ - ④ is positioned, care being taken to avoid excessive tension on the ends of the incision. The leg is internally rotated.

The interval between the gluteous medius and minimus is bluntly developed and a *MIS cobra retractor* ⑨ is passed from posterior to anterior to obtain exposure of the piriformis tendon. (Figure 1) The piriformis and superior gemellus tendons are released as close to their origins as possible. The more distal short external rotators (obturator internus, inferior gemellus, obturator externus and quadratur femorus) are bluntly elevated from the posterior-inferior hip joint capsule. A *MIS long double-bent hohman retractor* ⑤ is placed under these muscles around the inferior femoral neck. The gluteus minimus muscle is elevated from the ilium and the *MIS cobra retractor* ⑨ is repositioned under the gluteus medius and minimus muscles. (Figure 2) The superior, posterior and inferior capsule, which is now widely exposed, is circumferentially incised at the base of the femoral neck. A single radial incision is placed in the capsule at the level of the piriformis tendon. The posterior-inferior capsular flap that has been created is tacked to the piriformis-superior gemellus tendons for later reattachment. (Figure 3)

INSTRUMENTS USED FOR THIS TECHNIQUE



① **Assistant Free™ Self-Retaining Hip Surgery Retractor System Frames**

Product No's:
7450-01A [Standard Frame]
7450-01B [Medium Frame]
7450-01D [Square Frame]

② **Assistant Free™ Standard Blades**

Product No's:
7450-02 [2" blade depth]
7450-03 [3" blade depth]
7450-04 [4" blade depth]
7450-05 [5" blade depth]
7450-06 [6" blade depth]

③ **Narrow Assistant Free™ Retractor Blades**

Product No's:
7480-02 [2" Blade]
7480-03 [3" Blade]



④ **Malleable Assistant Free™ Retractor Blades**

Product No's:
7452-02 [2" blade depth]
7452-03 [3" blade depth]
7452-04 [4" blade depth]
7452-05 [5" blade depth]
7452-06 [6" blade depth]



⑤ **Single Prong Double Bent Hohman Acetabular Retractor – Long and Standard**

Product No's:
6210 [Standard]
6210-02 [Long]
6210-04 [Extra Long]

⑥ **Double Prong Double Bent Hohman Acetabular Retractor**

Product No: 6220

⑦ **Bone Pins (Retention)**

Product No's:
1230 [70mm Tube Pin-Pkg of 10]
1250 [Extender Pin-Pkg of 10]

The femoral head is partially dislocated (the leg is internally rotated approximately 45 degrees) with the hip flexed approximately 45 degrees. Complete dislocation of the femoral head at this stage of the procedure, though possible, will cause the short external rotator muscles which have been left attached to the femur to be avulsed. The **MIS long double bent hohman retractor** ⁵ which was placed under the short external rotators and around the femoral neck, is left in place as the leg is rotated. The femoral head is firmly grasped with a clamp. ¹⁴ A complete osteotomy of the femoral neck is performed using a narrow, long oscillating saw blade. The osteotomy is performed 5mm distal to the junction of the femoral head and neck. Because the distal short external rotators have been left attached, the lesser trochanter can not be visualized or accurately palpated. Therefore, final adjustment of the femoral neck cut is made, if desired, during the preparation of the femur. The femoral head is lifted out of the wound.

The **MIS double bent hohman retractor** ⁵ (which has a curved, sharp tip) is placed under the femoral neck. The tip is placed over the anterior lip of the acetabulum. The femur is translocated anterior to the acetabulum by applying firm, gentle pressure to the hohman retractor. This retractor is held in place with **modular weights**. ¹² Retention pins ⁷ are placed in the ilium (to retract the gluteus medius which overhangs the acetabulum superiorly) and in the ischium (to retract the gluteus maximus which overhangs the acetabulum posteriorly). Care is taken in placing the pins to avoid injury to the sciatic nerve and structures in the pelvic fossa.

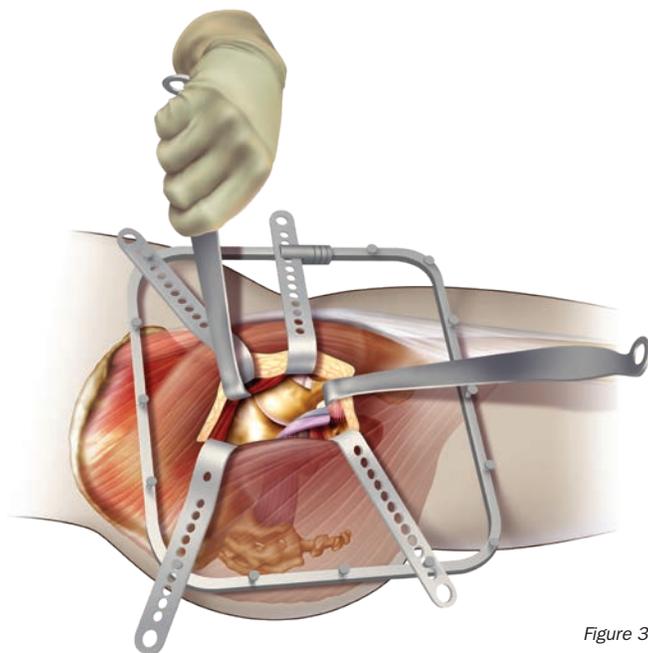
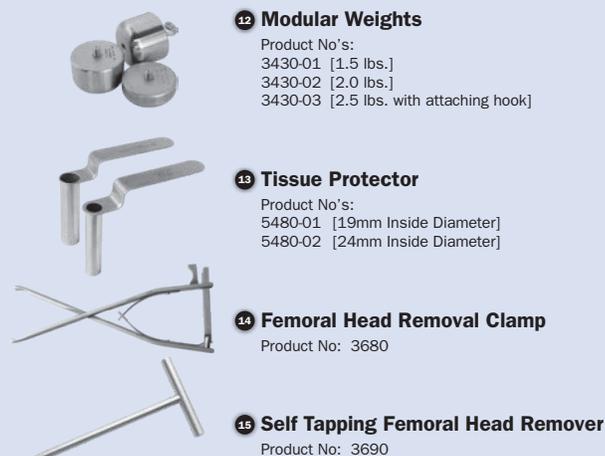


Figure 3

INSTRUMENTS USED FOR THIS TECHNIQUE



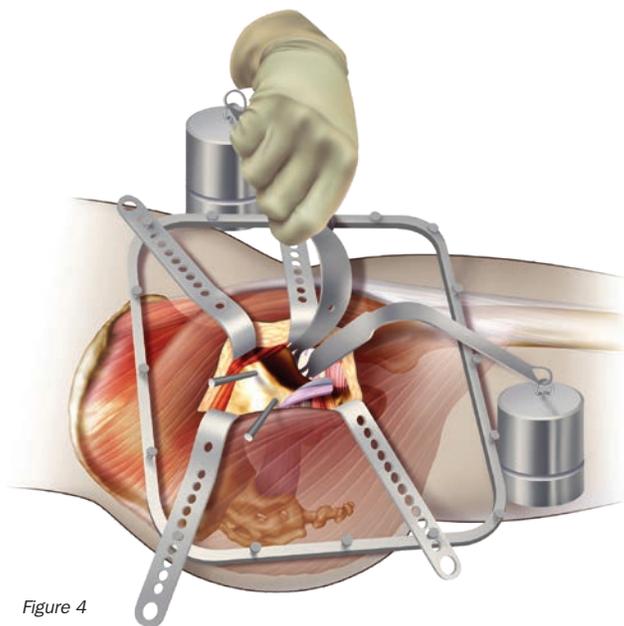


Figure 4

A MIS double-prong inferior acetabulum retractor ¹¹ is placed around the inferior lip of the acetabulum and held in place with modular weights ¹². (Figure 4)

This completes the exposure of the acetabulum. If soft tissue contractures, excessive synovium or overhanging osteophytes are present they can be treated as they would be through a standard posterior-lateral exposure. The acetabulum is prepared and the final implant inserted in the usual manner. Reamers specially designed for MIS incisions may be helpful if a small skin incision was made.

Once the acetabular preparation and implantation are complete, the proximal femur is prepared by flexing, adducting and internally rotating the lower extremity. A MIS proximal femoral elevator ⁸ must be used to expose the femoral neck without injuring the attached short external rotators. The MIS double bent hohman retractor ⁹ can be placed under the short rotators to protect them during reaming and broaching of the proximal femur. (Figure 5) Preparation of the proximal femur is performed in routine fashion.

Reamers are passed through a metal soft tissue protector ¹³ to prevent injuring the glutei muscles. If removal of additional femoral neck is required after the final broach has been completely seated, this is best accomplished using a planing device on power. The hohman retractor protects the attached short external rotators. Final implantation of the femoral component is performed in the usual manner. Final range of motion, stability, and soft tissue tension are checked in the routine way.

CLOSURE

Closure is carried out by first carefully reattaching the posterior capsule and short external rotators through drill holes in the greater trochanter. The posterior capsule can also be attached to the superior capsule (which may still be present) and posterior edge of the gluteus maximus. The short slit in the tensor fascia and the fascia overlying the gluteous maximus are re-approximated and the subcutaneous tissue and skin closed in layers.

The exposure does not require any alteration in routine post-operative care.

Innomed does not manufacture or distribute any hip prosthesis. This surgical technique is used by S. David Stulberg, MD. Innomed does not recommend or specify which technique, if any, be used on any specific patients.

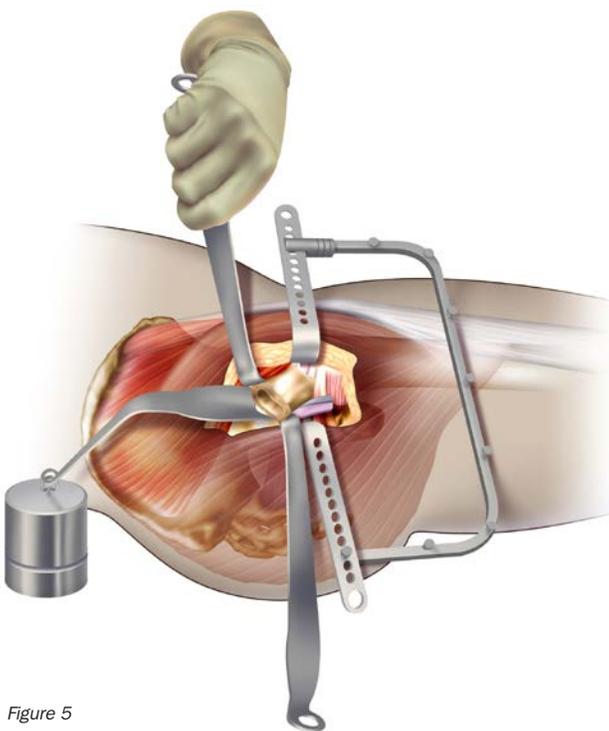


Figure 5

