

# THE CAPSULAR NOOSE:

## A New Technique to Reduce Dislocation after Posterior, Single-Incision MIS THA

TODD V. SWANSON, M.D. • DESERT ORTHOPAEDIC CENTER • LAS VEGAS, NEVADA, USA

### INTRODUCTION

Dislocation remains the most common complication after posterior approach total hip arthroplasty, with many studies reporting an incidence of 2-4% or higher. Releasing the external rotators and posterior capsule removes the normal mechanical constraint that resists posterior dislocation. Repairing the capsule and/or external rotators back either to the posterior greater trochanter or the posterior border of the gluteus medius tendon provides some protection against dislocation. However, studies have shown that this repair often fails early by pulling loose or even fracturing the greater trochanter. Other disadvantages include reduction in hip range of motion by creating a "check rein," creation of a large area of dead space behind the femoral head which can result in sudden, violent dislocation without warning in many patients, and difficult or impossible repair in cases of external rotation contractures or protrusio.

### METHODS

Beginning in May 2002, 280 consecutive posterior MIS THAs underwent noose reconstruction of the posterior capsule. Prior to May 2002, 450 consecutive MIS THAs underwent standard posterior repair of the capsule and external rotators to the posterior greater trochanter or gluteus medius tendon. All patients had minimum 12-months follow-up.

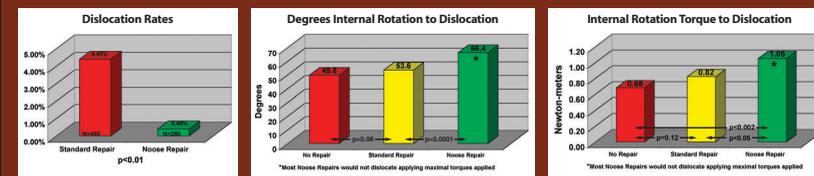
Twenty patients were studied intra-operatively to determine the amount of torque and degree of internal rotation to dislocation (a) without repair of the capsule or external rotators, (b) with standard repair of the capsule and external rotators to the posterior greater trochanter, and (c) with capsular repair using the noose technique.

Categorical variables were compared using the Chi-square test with Yates correction, and continuous variables were compared using the Student-t test.

### RESULTS

Only 1 of 280 hips in the Capsular Noose group has dislocated (0.4%), and this was an anterior dislocation that recurred and eventually required surgery. Using the standard repair technique, 20 of 450 hips dislocated (4.4%,  $p < 0.05$ ). Range of motion at final follow-up did not differ between the two groups.

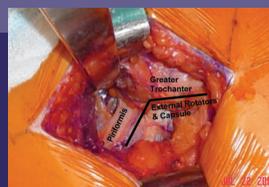
Intra-operatively, with the hip flexed 90°, the amount of internal rotation before dislocation was 49.8° (35-70°) with no repair, 53.6° (40-70°) with standard repair, and 66.4° (55-90°) with Capsular Noose repair. Mean torques to dislocation were 0.68 N-m (0.07-1.11) for no repair, 0.82 N-m (0.14-1.52) for the standard repair, and 1.05 N-m (0.50-1.82) for the Capsular Noose repair. Most Capsular Noose hips would not dislocate at the maximal torque applied; therefore, internal rotation at the maximal torque was recorded in these hips.



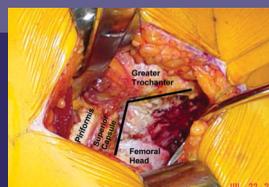
### SURGICAL TECHNIQUE

Using a posterior, single-incision MIS technique, the posterior capsule and external rotators are exposed. The capsule is split parallel and just inferior to the piriformis tendon which is left intact in most cases. The capsulotomy is carried distally, detaching capsule, gemelli, and obturator tendons from the proximal femur to the level of the upper quadratus femoris, allowing dislocation of the hip.

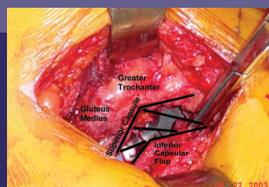
Once the total hip has been implanted, the "L-shaped" inferior capsular flap is repaired back to the superior capsule with heavy, #5 braided, nonabsorbable sutures. However, rather than repairing the capsule anatomically, the capsular flap is advanced 2-3 cm superiorly to tighten the capsule around the prosthetic neck and head like a noose, creating a tight constraint to posterior dislocation without limiting range of motion.



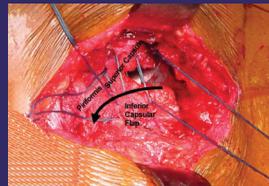
**1** Capsulotomy made inferior and parallel to piriformis tendon, detaching gemelli and obturator insertions with capsule from femur.



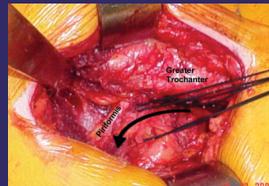
**2** Capsulotomy made. Femoral head and neck exposed. Piriformis remains intact.



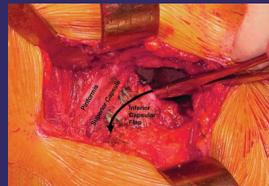
**3** Implants in place. Rather than anatomic capsular repair, inferior capsular flap advanced superiorly 2-3 cm.



**4** Braided #5 sutures used to advance and repair inferior capsule to superior capsule.



**5** Inferior capsule, gemelli, and obturator muscles advanced as a unit to superior capsule.



**6** Final closure showing tight, "noose-like" reconstruction of capsule around prosthetic head and neck.

### CONCLUSIONS

Capsular advancement is effective in resisting posterior dislocation after posterior MIS THA. The technique tightens the capsule circumferentially, not unlike that achieved with the "inferior capsular shift" procedure for the shoulder. Maintenance of the piriformis insertion to the greater trochanter adds additional posterior stability and external rotation strength without the risk of pull-off in the post-operative period.

The Capsular Noose repair is a difficult technique to master, but when performed properly, is extremely effective. In addition to the mechanical constraint provided by the repair, the patient likely senses discomfort when the capsule is stretched. This may provide a feedback mechanism that induces the patient to move the hip out of the "at-risk" position before it can dislocate.