

## **anterior capsular repair improve hip stability in total hip arthroplasty using direct anterior approach**

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### **INTRODUCTION:**

Dislocation is an important postoperative complication of total hip arthroplasty (THA). Hypotonia of the soft tissue around the hip was reported to be a risk factor for postoperative dislocation. THA using direct anterior approach (DAA-THA) does not require muscular dissection and is therefore considered to have higher soft tissue stability than posterior approach. However, whether the anterior articular capsule, as the only tissue that is incised intraoperatively in DAA-THA, is repaired after implantation varies from surgeon to surgeon. This is because it has not been proven that repairing the anterior capsule really contributes to hip stability with clinical analysis. The anterior capsule to be incised contains iliofemoral ligament, with the vertical band controlling hip extension and internal or external rotation, and the horizontal band controlling hip extension and external rotation. These ligaments are considered important soft tissues to prevent anterior dislocation during hip extension and external rotation after THA. Therefore, the aim of this study was to determine if the stability of the hip changes before and after anterior capsular repair in DAA-THA.

### **METHODS:**

Among the patients performed primary THA at our hospital using DAA between February 2018 and March 2020, 118 hips in 109 patients who underwent intraoperative hip stability test after anterior capsular repair were examined. The mean age of the patients was  $65.3 \pm 8.6$  years, and they consisted of 32 hips in 28 men and 86 hips in 81 women. The patient was placed in the supine position, and an incision was made between the sartorius muscle and tensor fasciae latae muscle, exposing the anterior capsule. A triangular flap was created for the anterior capsule based on the femoral attachment on the peripheral side. Simultaneously, an incision was made to preserve the vertical band of the iliofemoral ligament. After placement of the implant, the capsule suture was performed at the proximal side with modified Kessler suture, and knotted suture was performed in others. Before and after joint capsule repair, the head movement distance (HMD) when the operated limb was pulled 15kg was recorded in the anterior-posterior view of the hip under fluoroscopy at the neutral position and the extension at  $10^\circ$  of the hip. The differences in HMD before and after anterior capsule repair were compared as joint braking distance (JBD) by capsule repair. We also examined the correlations between the HMD before and after suturing and the amount of leg elongation.

### **RESULTS:**

The mean HMD prior to capsule repair was  $6.1 \pm 5.2$  mm in the hip neutral position, and  $7.0 \pm 3.6$  mm in the  $10^\circ$  extension position. The HMD after capsule repair was  $3.7 \pm 3.8$  mm and  $3.9 \pm 4.1$  mm, in the hip neutral and  $10^\circ$  extension positions, respectively. HMD significantly decreased after capsule repair in both the hip neutral and extension positions ( $p < 0.05$ ). Furthermore, there was no obvious statistical significance in the comparison between the hip neutral and extension positions before and after hip capsule repair. A positive correlation was noted between HTD and JBD before capsule repair in both the hip neutral and  $10^\circ$  extension positions ( $r = 0.8273$ ,  $p < 0.0001$ ;  $r = 0.8089$ ,  $p < 0.0001$ ). When HMD before and after capsule repair was compared with the leg length change, no correlation was observed between the hip neutral and  $10^\circ$  extension positions ( $r = 0.224$ ,  $p = 0.099$ ;  $r = 0.229$ ,  $p < 0.172$ ). None of the patients included in this study had postoperative dislocations.

### **DISCUSSION AND CONCLUSION:**

We evaluated the stability against hip traction before and after anterior capsule repair in DAA-THA by anterior capsulotomy. The results showed that the hip was significantly stable due to anterior capsule repair, and that the effect of joint repair was higher in cases with higher instability before the repair. This is the first report to show that anterior capsule repair in DAA-THA contributes to THA stability. A cadaver study reported that when the anterior capsule was incised to be orthogonal to the femoral neck of the native hip, the stability of hip traction decreased as the length of incision increased. The results of the present study showed, as in the cadaver study for native hip, that the incision of anterior capsule decreases joint stability in patients with THA. Furthermore, repairing the anterior capsule was thought to improve stability and contribute to the prevention of postoperative dislocation. The average values have a difference of approximately 3 mm, which some surgeons may consider insignificant. However, we often experience that, during THA, a few millimeters of adjustment by changing the head significantly changes the stability of the prosthesis. Therefore, it is considered that a difference of several millimeters before and after joint capsule repair is clinically important. Therefore, anterior capsule repair may suppress postoperative anterior dislocation in DAA-THA, and capsular repair should be performed, particularly in cases that are unstable against hip traction prior to joint capsule repair.