The Effect of Capsulectomy On Hip Joint Biomechanics

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Objectives: Hip arthroscopy is performed in young adult patients with hip pain. During arthroscopy, capsulectomy is performed to improve intraoperative visualization. The stability of the hip joint after capsulectomy is relatively unknown. Our study evaluated anterior hip stability in capsular sectioned states with labral injury. We theorized the load required for anterior translation would decrease with greater capsular injury.

Methods: Ten human cadaveric pelvises (20 hips, mean 54.25 years) without radiographic evidence of degeneration or dysplasia were harvested. The hips were prepared and mounted onto a custom built testing fixture. Two pelvises were excluded due to fixation issues for one or both hips. The 16 hips were tested in five states (table 1). Each hip was tested in neutral position with a 20N compressive force. The capsular incision was made in-line with the femoral neck. The labrectomy was made at 2:30 position. The sutured capsule was created using #2 Ethibond suture 1cm apart along the incision. The partial capsulectomy was made by resecting the iliofemoral ligament, leaving the pubofemoral and ischiofemoral ligaments intact. Total capsulectomy state was created by removing the remaining capsule. The load at 12mm of anterior translation was recorded for each state after two preconditioning trials.

Results: A repeated measures ANOVA with a Bonferroni adjustment showed no difference between all-intact vs. sutured-intact. It also demonstrated no significant difference between the sutured-intact and the sutured labrectomy states. A repeated measures ANOVA with a Bonferroni adjustment was run to compare the capsular states with a 1cm partial labrectomy (table 2). There was a significant difference between the sutured-labrectomy and the partial capsulectomy (p=0.0146) and between the sutured-labrectomy and the total capsulectomy (p=0.0005). There was also a significant difference when comparing the partial capsulectomy and the total capsulectomy (p=0.0377).

Conclusion: The findings demonstrate that both the capsule and labrum play a role in providing anterior hip stability. These results indicate that the iliofemoral ligament is crucial for preventing anterior translation in labral injured states. Intraoperative capsulectomy should be avoided in patients with large irreparable labral tears to prevent postoperative anterior hip instability.

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Capsular States

|                | All - intact | Sutured - intact | Sutured - labrectomy | Partial capsulectomy | Total capsulotomy |
|----------------|--------------|------------------|----------------------|----------------------|------------------|
| Mean Load (N)  | 160.8        | 160.2            | 158.3                | 122.8                | 99.3             |