

ROLE OF THE HIP CAPSULE ON JOINT STABILITY DURING EXTERNAL ROTATION

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ABSTRACT

Arthroscopic hip preservation is one of the fastest growing fields in orthopaedic surgery. To visualize the hip joint for procedures, a capsulotomy must be performed. Two commonly used approaches are interportal capsulotomy and T-capsulotomy. The necessity of capsular repair after arthroscopy has been debated. In this study, biomechanical impacts of interportal and T-capsulotomies as well as partial and full repairs of the capsule were evaluated by sequentially testing fresh-frozen cadaveric hemi-pelvis specimens under external rotation of the hip. All four capsular operated conditions had significantly increased mean range of motion over the intact group. Joint laxity, as measured by neutral zone range, was significantly increased in T-capsulotomy and partial repair over the intact. However, no significant differences were detected in construct stiffness among all conditions. Results demonstrated that capsulotomy mostly affected joint laxity. Full repair of the capsule restored stability to the state of interportal capsulotomy but not to the intact.

Keywords: hip arthroscopy, capsulotomy, external rotation, range of motion, biomechanics

INTRODUCTION

Surgical management of pre-arthritis hip conditions have increased exponentially in the past decade, particularly due to the advancement in hip arthroscopy [1-3]. Unlike arthroscopy of other joints, a capsulotomy is often necessary to improve visualization and increase instrument maneuverability. Two of the most commonly used approaches are interportal capsulotomy (anterolateral portal to mid anterior portal) and T-capsulotomy. Interportal capsulotomy allows excellent viewing of the central compartment, including the labrum, acetabular rim, and articular cartilage. T-capsulotomy, with an additional incision perpendicular to the interportal capsulotomy, separates the medial and lateral portions of the iliofemoral ligament and improves visualization of the peripheral compartment [4]. The improved visualization subsequently may decrease the likelihood of the need for revision due to recurrent impingement from inadequate osteoplasty [5,6].

The necessity of capsular repair after arthroscopic procedure has been debated. The decision to leave the capsulotomy open or perform a complete or partial repair is typically made depending on factors such as patient age, BMI, gender, and degree of chondral damage [7]. Proponents of repair argue that intact hip capsules play a significant role in maintaining joint stability, and when left unrepaired it may lead to increased risk of post-operative hip dislocation or painful micro-instability [8,9]. This has been shown in retrospective outcome studies, where superior results were reported in patients who have had capsular repairs [10]. On the other hand, opponents argue that the repair over-constrains the hip by over-tightening the capsule and that unrepaired capsulotomy causes no serious implications [11]. Despite these significant concerns, quantitative investigations into biomechanical effects of capsulotomy are limited. Recent reports on the effectiveness of capsular repairs in restoring rotational stability yielded inconsistent results [4,12-16]. Evidence pertaining the effects of partial capsular repair is also lacking.