ECRONICON OPEN ACCESS

EC ORTHOPAEDICS
Review Article

Arthroscopic Hip Capsule Closure Technique: Time Efficiency in the Operating Room

Jon Anthony*, Andrew Hadeed and Brian H Goldman

Department of Orthopedic Surgery, Larkin Community Hospital, South Miami, FL, USA

***Corresponding Author:** Jon Anthony, Department of Orthopedic Surgery, Larkin Community Hospital, South Miami, FL, USA.

Received: April 14, 2019; **Published:** May 28, 2019

Abstract

Hip arthroscopy procedures have potential to manage various hip pathologies in a minimally invasive manner. The discussion over capsule closure is a highly debated topic. There is argument that the lack of capsule closure results in hip subluxation, dislocation, and instability as well as higher conversion to total hip arthroplasty. On the other hand, others view capsule closure not affecting clinical outcomes and only prolongs operative time. Through the described technique, we hope to demonstrate a time efficient technique that will encourage more orthopedic surgeons to perform capsule closure.

Keywords: *Hip Arthroscopy; Capsule Closure; Femoral Acetabular Impingement; Arthroscopy; Hip Capsule; Operative Time*

Abbreviations

ALP: Anterolateral Portal; MAP: Midanterior Portal; FAI: Femoral Acetabular Impingement; G: Gauge

Introduction

There is much debate in literature on whether or not to fix the hip capsule during hip arthroscopy. It adds a significant amount of operative time to the surgery, especially with the steep learning curve of hip arthroscopy itself [1,2]. The decision to close the capsule is left up to time constraints and surgeon experience [3]. So why even arthroscopically repair the hip capsule in the first place?

We do know the complex relationship the congruence of the femoral head and acetabulum, the muscle forces, the capsule/ligaments, and the suction created all contribute to the stability of the hip [3]. When we enter the hip and make the capsulotomy, we disrupt the iliofemoral ligament. This allows us to enter the central and peripheral compartments [3]. This ligament is the primary structure for stabilizing external rotation and anterior translation of the hip [3]. This capsular and ligamentous disruption changes the biomechanics, stability, and restraints of the hip [4,5]. Capsular and ligamentous disruption may result in increased subluxations, dislocations, and instability [3].

Many studies have demonstrated improved biomechanical and clinical results with capsular closure. We propose a new technique to simplify capsular closure and take advantage of the improved biomechanics obtained with closure. Our method allows for early capsular management, adequate exposure, quick and reproducible closure of the capsule.

Surgical technique

Patient is placed supine on Arthrex Hip Distraction System (Naples, FL) under general anesthesia, with attention to placement of well-padded boots and perianal post. Trial of distraction under fluoroscopy is then initiated to ensure adequate distraction of hip joint can be achieved. An 18 gauge (G) spinal needle can be introduced into the hip joint with injection of air to help distract joint if needed. Once adequate visualization is noted, traction is released.

Patient is then prepped and draped in normal orthopedic fashion. We use the standard anterolateral portal (ALP) and mid-anterior portal (MAP) [1].

Attention is first directed to the ALP. An 18G spinal needle introduced into hip joint from 2 cm anterior and 2 cm superior to the antero-superior border of the greater trochanter (Figure 1) [1]. A 1.1 mm flexible Nitinol guide wire is threaded through the needle. The spinal needle is removed, and the dilator is then introduced. The dilator is exchange for the obturator, which is in turn exchanged for the 7 mm cannula. A 70-degree camera is introduced, and the intraarticular location is visualized. Attention is then directed toward the MAP located 3 cm anterior and 4 cm distal to ALP (Figure 1) [1]. At this point, the 18G spinal needle is introduced into joint under direct visualization making sure to pass in front of the labrum and not through it. The cannula is then inserted in the same fashion as before. The camera is then switched to the MAP in order to make the capsulotomy. Small and medium deformities can be addressed with an interportal capsulotomy while larger deformities may require a T-capsulotomy [3]. The Samurai Blade (Stryker Kalamazoo, MI) is used to make interportal capsulotomy from 11 to 2:30 position [6]. If a T-capsulotomy is required, extend the incision down the femoral neck.

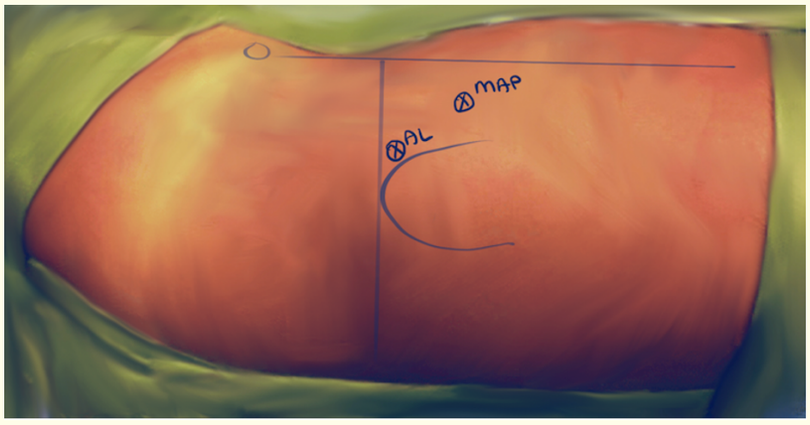

Figure 1: *Placement of both ALP and MAP portals marked on patient's skin prior to incision.*

Capsular management

At this point we place retraction sutures in order to control the capsule. We do this with the Pivot Slingshot Injector 2 (Stryker Kalamazoo, MI), three #2 FiberLink (Arthrex Naples, FL) sutures, and three #2 Vicryl sutures. The Injector 2 is inserted through the MAP loaded with FiberLink. The proximal limb of the capsule is address first; the suture is passed about 3mm from the capsular edge near the medial corner of the incision. The suture is passed from outside the capsule to inside, and then retracted when the instrument is removed. Bring the sutures out through the ALP with the suture retriever. Repeat the procedure with and 2nd and 3rd FiberLink and the middle and lateral corner of the capsulotomy on the proximal limb bringing all the sutures out through the ALP (Figure 2). Use a snap to secure all of the sutures from the proximal limb.

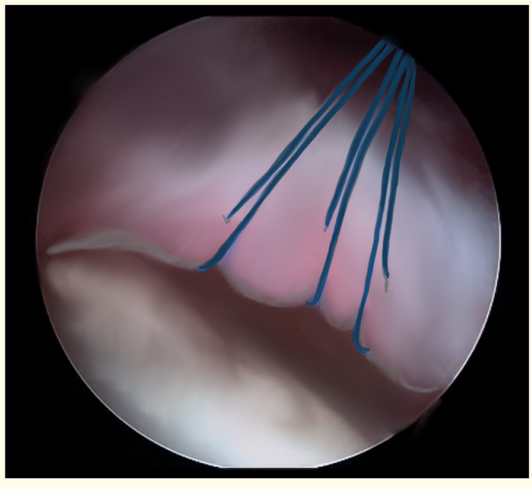

Figure 2: *Placement of 3 FiberLink sutures in the proximal limb of the capsule.*

Next address the distal limb of the capsule. Pass three #2 Vicryl sutures at the medial, middle, and lateral corner of the capsulotomy 3 mm from capsular edge in similar fashion. Bring all the sutures out through the ALP. Use a snap to secure all of the sutures from the distal limb. This allows retraction of the capsule and provides adequate visualization so that you are able to address the intraarticular pathology. Visualization is of extreme importance; the most common failure of hip arthroscopy is inadequate resection [3].

Capsular closure

Once all of the intraarticular pathology has been addressed, one can then proceed with closure of the capsule. Traction is released and hip is flexed in order to reduce pressure on the capsule [6]. The capsule is addressed from medial to lateral. The intraarticular limbs of the FiberLink and Vicryl sutures from the medial corner of the capsular incision are both brought out of the MAP with the suture retriever while leaving the remaining sutures in the ALP. At least 2 cm of the Vicryl suture is passed through the loop in the FiberLink. While securing the extraarticular limb of the Vicryl suture, the extraarticular limb of the FiberLink is withdrawn from the MAP cannula. This brings the Vicryl suture through the proximal limb of the capsule (Figure 3).

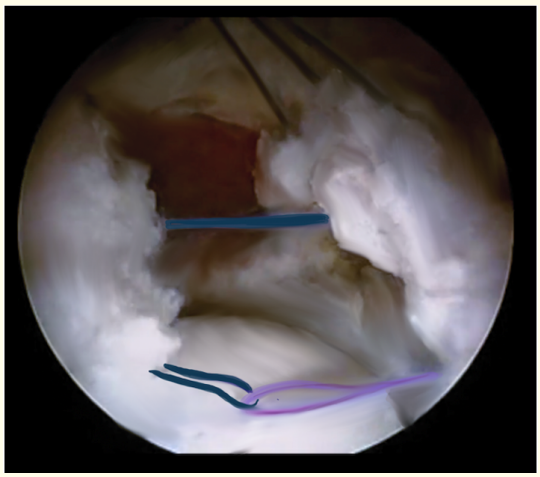

Figure 3: *Vicryl suture passing between the distal and proximal limbs of the capsule.*

The middle and lateral corner of the capsular incision are then addressed in the same fashion (Figure 4).

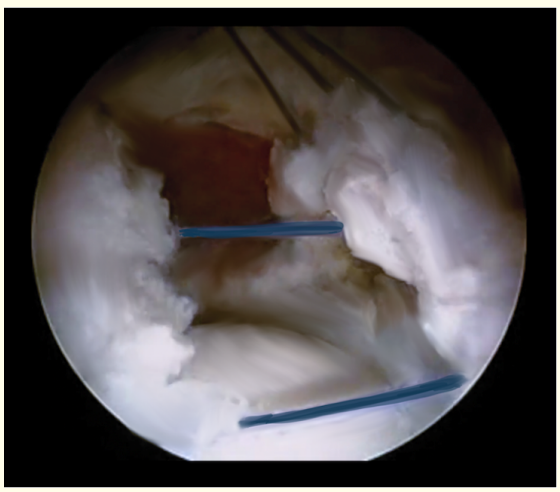

Figure 4: *All 3 Vicryl sutures are passed between the distal and proximal limbs of the capsule.*

Be sure that all the Vicryl sutures are passed through the proximal limb before tying to ensure adequate working space and visualization [7]. The sutures are then tied with a sliding knot followed by 4 arthroscopic knots in standard arthroscopic fashion (Figure 5). Excess suture is then cut with the arthroscopic cutter.

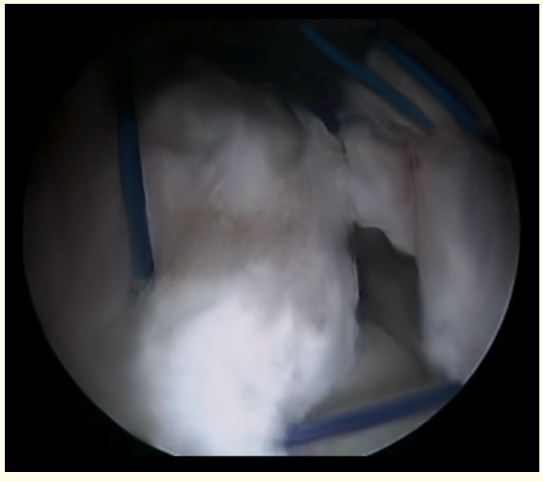

Figure 5: *One of three capsular sutures tied with arthroscopic knots.*

During the rehabilitation period, the patient is placed in a ROM hip brace limiting both flexion past 90 degrees and external rotation for 4 weeks in all patients. We recommend the use of a hip brace postoperatively to protect the repair especially from flexion and external rotation. Biomechanical studies have demonstrated external rotation past approximately 35% leads to failure of repair even while using 3 sutures for closure [8]. The rehabilitation protocol is adjusted according to patient and procedure performed.

Discussion

We believe that there is a target audience for hip arthroscopy. We reserve it for the young patient without arthritis whom is symptomatic and has evidence of impingement [1]. We recognize that poorer outcomes are seen if the patient already has arthritis and should be avoided with Tonnis grade > 1 or < 2 mm of joint space [1]. Hip arthroscopy has been shown to have outcomes comparable or even better than open treatment of femoral acetabular impingement (FAI) in pain relief and return to sports [1,9].

Hip arthroscopy has a very steep learning curve [1,2]. We hope to simplify it with this procedure. Our technique allows for placement of capsular sutures at the beginning of the case; which can be used for capsule retraction throughout the case and capsular closure at the end of the case. Closure should not be the most time-consuming part of the case. With the Pivot Slingshot Injector 2, passing the suture through the capsular limbs is a simple one step process done at the beginning of the case. Additionally, passing the suture between the limbs is performed outside the joint as opposed to other capsule closure techniques. This is a reproducible and efficient method that can decrease operative time.

Conclusion

We address capsular closure in all our hip scopes when possible, with emphasis on the importance of capsular closure in young patients, athletes, or patients with laxity. Violation of the capsular and ligamentous changes the biomechanics, stability, and restraints of the hip and can lead to increased subluxations, dislocations, and instability [3-5]. With closure of the capsule, we are partially able to reduce the increases in external, internal, adduction, and abduction caused by the arthroscopic capsulotomy [10]. The importance of capsular closure may not be as important for initial short-term results; however, it has been shown that patients with unrepaired capsules have a higher conversion to arthroplasty and deterioration in their modified Harris Hip Score as midterm follow-up [11].

We recommend the use of three capsular sutures for closure. Three sutures resulted in the strongest biomechanical construct, as seen with biomechanical studies looking at failure torque and number of sutures used. Both two and three sutures were significantly greater than one suture. Three sutures yielded the highest maximal torque, however, this was not statistically significantly greater than two sutures [8].

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Bibliography

1. Nasser Rima and Benjamin Domb. "Hip Arthroscopy for Femoroacetabular Impingement". *EFORT Open Reviews* 3.4 (2018): 121-129.
2. Nawabi Danyal H., *et al*. "Learning Curve for Hip Arthroscopy Steeper than Expected". *Journal of Hip Preservation Surgery* 3.1 (2016).
3. Nepple Jeffrey J and Matthew V Smith. "Biomechanics of the Hip Capsule and Capsule Management Strategies in Hip Arthroscopy". *Sports Medicine and Arthroscopy Review* 23.4 (2015): 164-168.
4. Abrams Geoffrey D. "Editorial Commentary: Not Repairing the Hip Capsule After Arthroscopy-What Were We Thinking?" *Arthroscopy* 34.1 (2018): 319-320.
5. Matsuda Dean K. "Editorial Commentary: Hip Capsule: To Repair or Not?" *Arthroscopy* 33.1 (2017): 116-117.
6. Uchida Soshi., *et al*. "Arthroscopic Shoelace Capsular Closure Technique in the Hip Using Ultratape". *Arthroscopy Techniques* 6.1 (2017): e157-e161.
7. Camp Christopher L., *et al*. "A Simple Technique for Capsular Repair After Hip Arthroscopy". *Arthroscopy Techniques* 4.6 (2015): e737-e740.
8. Chahla Jorge., *et al*. "Hip Capsular Closure". *Orthopaedic Journal of Sports Medicine* 5.3 (2017): 2325967117S0011.
9. Nwachukwu Benedict U., *et al*. "Arthroscopic Versus Open Treatment of Femoroacetabular Impingement". *The American Journal of Sports Medicine* 44.4 (2016): 1062-1068.
10. Philippon Marc J., *et al*. "Biomechanical Assessment of Hip Capsular Repair and Reconstruction Procedures Using a 6 Degrees of Freedom Robotic System". *The American Journal of Sports Medicine* 45.8 (2017): 1745-1754.
11. Domb Benjamin G., *et al*. "Patient-Reported Outcomes of Capsular Repair Versus Capsulotomy in Patients Undergoing Hip Arthroscopy: Minimum 5-Year Follow-up-A Matched Comparison Study". *Arthroscopy* 34.3 (2018): 853-863.e1.

Volume 10 Issue 6 June 2019