Failed Hip Arthroscopy: Causes and Treatment Options

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educational objectives

As a result of reading this article, physicians should be able to:

1. Identify the underlying factors and diagnoses associated with unsatisfactory postoperative outcomes after hip arthroscopy.

2. Outline the necessary steps for preoperative identification of developmental dysplasia of the hip and assess how it can affect the outcome of arthroscopy for labral pathology.

3. Identify the association of unrecognized femoroacetabular impingement lesions with suboptimal outcomes.

4. Identify whether labral debridement or labral repair is associated with improved postoperative outcomes.

ABSTRACT

Indications for arthroscopic surgery of the hip have increased over the past several years, along with the number of procedures performed annually. In addition, the number of unsuccessful procedures and subsequent revision surgeries have also increased. Recent literature has defined several common causes for failed hip arthroscopy. Severe osteoarthritis and osteonecrosis are associated with poor outcomes. Findings during revision hip arthroscopy consistently demonstrate untreated femoroacetabular impingement, chondral defects, labral tears, and postoperative adhesions. The treating surgeon must be diligent in his or her indications for surgery, as well as in addressing all pathology at the initial surgery.

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Access to the hip joint by arthroscopic means was once considered an impossible task due to the complexity of the joint and the inability to insert an instrument directly between the femoral head and acetabulum. Since Burman’s initial report, advances in surgical techniques have not only proven arthroscopy to be a safe and effective tool in treating hip pathology, but have also allowed for the diagnosis of previously unrecognized, and thus untreated, hip conditions. It is important to recognize that such strides have created new options for patients and surgeons and have provided a greater understanding of the nature of the intra-articular hip pathology.

Indications for hip arthroscopy have expanded significantly and currently include symptomatic acetabular labral tears, hip capsule laxity and instability, chondral lesions, osteochondritis dissecans, ligamentum teres injuries, snapping hip syndrome, ilioptsoas bursitis, loose bodies, and femoroacetabular impingement. Less commonly used indications include management of the early stages of osteonecrosis of the femoral head, synovial abnormalities, crystalline hip arthropathy, infection, and posttraumatic intra-articular debris. Under judicial discretion of the treating surgeon, hip arthroscopy has been useful in treating symptoms and delaying the need for total hip arthroplasty (THA) in some cases of mild to moderate osteoarthritis. This expanding list of indications and operative techniques has led to a subsequent increase in hip arthroscopy procedures performed annually. Consequently, this has also led to an increase in failed arthroscopy and revision procedures.

Presence of Osteoarthritis

Although hip arthroscopy has become a reliable option in treating many pathologic hip conditions, the treating physician must be diligent in assessing the overall condition of the joint, as well as in making an accurate preoperative diagnosis. Failed hip arthroscopy, defined as either persistent pain or eventual total hip replacement, has been attributed to incorrect preoperative diagnosis and poor patient selection. In determining whether hip arthroscopy is an option for the treatment of a particular condition, the treating physician should pay considerable attention to the presence and the degree of degenerative change within the hip joint. Current evidence demonstrates limited success and suboptimal outcomes after arthroscopic intervention indicated for symptomatic relief of early stages of osteoarthritis. Furthermore, the presence of arthritis in conjunction with any other indication for arthroscopic intervention has been shown to be an indicator of poor postoperative results. Beck et al. evaluated the outcomes of arthroscopy in 19 patients with femoroacetabular impingement, noting that 5 patients underwent a THA at an average of 3.1 years postoperatively. Of these 5 patients, 2 had a preoperative diagnosis of grade II osteoarthritis (defined as thinned cartilage and possible full-thickness defects and fissuring to subchondral bone), 2 had severe acetabular cartilage damage in combination with a large defect in the femoral head, and 1 had an untreated ossified labrum. These findings were apparent preoperatively, and the authors concluded that these failures were due to poor patient selection. They cited the importance of preoperative diagnosis and scrutiny of the plain radiographs for signs of osteoarthritis. Further studies affirmed the findings of Beck et al. Murphy et al. reviewed 23 cases of arthroscopic debridement for femoroacetabular impingement and reported that 7 of these patients went on to undergo a THA. One patient had circumferential osteophyte formation causing extrusion of the femoral head, and 2 had residual untreated acetabular dysplasia. The remaining 4 patients underwent conversion to THA between 6.4 and 9.5 years postoperatively, enjoying improvement in symptomatology and function in the intervening time period.

Horisberger et al. determined that 10 of 20 patients undergoing arthroscopy for femoroacetabular impingement who presented with preoperative osteoarthritis in addition to chondral damage underwent a subsequent THA. Of these patients, 3 were diagnosed preoperatively with Tönnis grade 1 osteoarthritis, 2 with grade 2, and 5 with grade 3 (defined as debonding of cartilage from subchondral bone). In a retrospective review, Kim et al. also reported that arthroscopic intervention for early-stage osteoarthritis in the presence of femoroacetabular impingement is associated with poor clinical results because of a failure to alleviate symptoms associated with osteoarthritis.

Philippon et al. evaluated the role of microfracture for the treatment of chondral lesions. They performed second-look arthroscopy on 9 patients and reported 95% to 100% fill of the lesions in 8 patients. The repair product appeared normal and was difficult to discern from the surrounding cartilage or demonstrated mild fibrillations and softening or discoloration. The sole failure was noted to be in a patient with diffuse osteoarthritis. The authors concluded that a microfracture technique may be applicable to chondral lesions of the hip, similar to the level of success that has been demonstrated in knee arthroscopy.
free vascularized fibular graft. Thirty-four of 37 patients were found preoperatively to have Ficat stage III or IV involvement of the hip and were indicated for debridement of the unstable cartilage lesions and associated mechanical symptoms. Overall results were poor, with only 35% reporting significant relief of symptoms postoperatively. Forty percent of patients underwent conversion to THA at an average of 8 months postarthroscopy. However, patients with mechanical symptoms seemed to fare better after arthroscopy that patients with pain alone.6

Byrd and Jones13 prospectively evaluated 52 hips with a 10-year follow-up and reported that 27% were converted to THA. Of the 14 patients with osteoarthritis, 11 were converted to THA, and 75% of patients diagnosed preoperatively with osteonecrosis underwent THA during the study period. The authors noted that the results of these patients were uniformly poor.13 These findings highlight the importance of patient selection and preoperative diagnosis with regard to osteoarthritis and osteonecrosis in predicting success of arthroscopic treatment of hip discomfort and tempering patient expectations.

Failed Hip Arthroscopy and Revision Findings

Because hip arthroscopy is an emerging surgical technique, literature regarding failed hip arthroscopy and related causes is sparse. Several causes have been linked to unsuccessful hip arthroscopy and persistent impingement, which include undressed bony abnormalities and dysplasia, unaddressed or inadequately addressed femoroacetabular impingement, chondral defects, postsurgical adhesions, undressed instability, iatrogenic causes, and the decision between labral debridement vs labral repair.

Bony Abnormalities and Hip Dysplasia

Developmental dysplasia of the hip (DDH) is a condition associated with morphologic bony abnormalities that often results in intra-articular lesions and can be the source of significant mechanical hip pain.14,15 Such abnormalities can be associated with hypertrophy of the labrum to increase the weight-bearing surface area in an attempt to compensate for a lack of joint stability and coverage of the femoral head. Such compensation exposes the labrum to abnormal mechanical forces and predisposes it to tearing.14 Symptomatic labral tears associated with pathologies such as femoroacetabular impingement are a usual indication for arthroscopic treatment; however, addressing similar pathology associated with DDH with arthroscopic debridement or repair proves to be a more complex matter.16 Patients with labral tears due to underlying DDH may expect to have little to no symptomatic benefit from the procedure.14,17,19

Acetabular labral tears treated symptomatically without recognizing or addressing the underlying etiology of DDH is a likely cause of failure of arthroscopic means.18 Failure rates may also be attributed not only to the fact that DDH is the fundamental cause of symptomatic tears, but also to the complexity of intra-articular pathology caused by the presence of radiographic evidence of dysplasia. Byrd and Jones14 retrospectively reviewed 48 patients with dysplasia who underwent hip arthroscopy for various indications. Dysplasia was defined as a center-edge angle less than 25º. All patients were noted to significantly improve with regard to pre- and postoperative modified Harris Hip Scores, with 79% experiencing an improvement greater than 10 points. The authors proposed that DDH is not an absolute contraindication to hip arthroscopy.14

Conversely, Parvizi et al18 proposed that arthroscopic labral excision alone in these cases is not only indicative of poor clinical results, but it may also cause more harm to the patient. It has been hypothesized that excision alone in the presence of DDH may further compromise the biomechanics of the hip and increase stress on the lateral region of the acetabulum. In addition, patients with DDH are also likely to have chondral lesions that are contributing to their symptoms. Arthroscopic debridement of these lesions without addressing the morphological condition that led to such symptoms is likely to compromise and exacerbate deterioration of the remaining labrum and articular cartilage, accelerating the onset of osteoarthritis in some cases.18 In patients presenting with hip pain due to symptomatic dysplasia, it is imperative to identify this pathology from radiographs and a thorough history and physical examination due to the aforementioned shortcomings in only treating the resulting labral tears. For individuals with DDH, the underlying pathology should be addressed and is done so through procedures such as a Ganz periacetabular osteotomy.20

Femoroacetabular Impingement

Femoroacetabular impingement is the result of abnormal contact between the head of the femur and the acetabulum leading to hip pain, chondral pathology, and eventual osteoarthritis. Femoroacetabular impingement has 2 distinct mechanisms: cam and pincer impingement. Cam impingement results from an abnormal femoral head–neck junction contact with the acetabulum. Such impingement leads to shearing stress on the acetabulum resulting in acetabular chondral delamination and labral detachment and degeneration. Pincer impingement is the result of a deep acetabulum and local anterior or posterior overcoverage, leading to crushing of the labrum between the abnormal acetabulum and femoral neck.5,21

In general, arthroscopic treatment of femoroacetabular impingement has been successful, but in the published research regarding revision hip arthroscopy, the leading indication is persistent symptomatic impingement.19 Although femoroacetabular impingement has 2 distinct mechanisms, it is not uncommon for an individual to have pain resulting from a
combined cam–pincer lesion. A failure to recognize or inadequately address such combined lesions may result in persistent pain and a subsequent revision procedure. Heyworth et al reviewed 24 cases of revision hip arthroscopy and reported that 54% of cases had no improvement after the index procedure. The most common reason for revision arthroscopy was unaddressed or untreated bony impingement lesions, which were found in 79% of cases. Furthermore, 25% of the patients underwent treatment of either a cam or pincer lesion at the time of index surgery, only to have the corresponding lesion treated at the revision surgery.

Philippon et al reviewed 37 procedures and reported that 95% of revision cases were performed for unaddressed femoroacetabular impingement. Untreated labral lesions and chondral pathology were also common in conjunction with the femoroacetabular impingement. All but 1 case had prerevision radiographic findings indicative of femoroacetabular impingement.

CHONDRAL DEFECTS

Perhaps one of the most predictive preoperative prognostic factors in the success of hip arthroscopy is the degree of chondral damage within the hip joint prior to the procedure. In patients seeking revision hip arthroscopy for unresolved impingement, these symptoms were due to persistent cartilage damage in 70% of cases. The degree of chondral damage has been determined to be an independent predictor of arthroscopic failure, even when considering hip arthroscopy for current indications, such as femoroacetabular impingement. Specifically, a preoperative diagnosis of Outerbridge grade 2 or higher cartilage lesions will significantly reduce the effectiveness of arthroscopic treatment.

Failure to recognize advanced cartilage damage within the acetabulum is an independent negative prognostic factor for successful hip arthroscopy. Londers and Van Melkebeek evaluated the success of hip arthroscopy with long-term follow-up in patients with no preoperative radiographic evidence of osteoarthritis or bony abnormalities. Of the 56 cases studied, 33 patients presented with Outerbridge grade 1 or 2 cartilage lesions in addition to pathology such as labral tears, loose bodies, or synovial hypertrophy. All 33 patients reported positive results at short-term follow-up, and 30 continued to report alleviation of symptoms at 5- to 10-year follow-up. However, 10 patients initially presented with Outerbridge grade 3 or 4 cartilage lesions in addition to labral tears or loose bodies. At 3-month follow-up, all 10 patients reported no change or worsening of their symptoms. At the final evaluation between 5 and 10 years postoperatively, 7 of these patients underwent conversion to THA.

The role of cartilage lesions in femoroacetabular impingement treatment and outcomes has been demonstrated to have limiting effects. Javed and O’Donnell evaluated 40 patients older than 60 years undergoing arthroscopic intervention for femoroacetabular impingement. Seven of these patients presented with Outerbridge grade 3 cartilage lesions, and all 7 patients had a THA within an average of 12 months postarthroscopy.

The role of articular cartilage lesions in debridement of labral lesions, as well as the significance in the difference in Outerbridge grading, was demonstrated by Streich et al. They reviewed 50 cases indicated for hip arthroscopy for the treatment of labral tears without evidence of femoroacetabular impingement or dysplasia. Thirty of the patients presented with lesions less than Outerbridge grade 2, whereas 20 presented with lesions greater than or equal to grade 2. Postoperatively, the group with lesions less than grade 2 showed no degenerative alterations and showed clinical improvement, whereas all 20 patients with lesions greater than or equal to grade 2 remained at the same level of clinical symptomology or worsened. Such findings yielded a conclusion that cartilage lesions are a limiting factor in outcomes of hip arthroscopy when present.

McCarthy et al reported that high-grade acetabular or femoral chondral lesions were associated with 22% and 12% 10-year hip arthroscopy survivorship, respectively. Furthermore, they determined that the presence of Outerbridge grade 3 or 4 cartilage lesions correlates with a 20- to 58-times increase in the likelihood of failed arthroscopy and the need for conversion to THA.

With such statistics, it is imperative to note the importance of patient selection and diligence in preoperative diagnosis. Radiographs and magnetic resonance imaging tend to underestimate the degree of chondral lesions and osteoarthritis. Magnetic resonance arthrography may provide better visualization of chondral defects than plain magnetic resonance imaging, although this modality is still somewhat limited. Further improvements in magnetic resonance resolution and imaging are necessary for better visualization of such defects to help identify patients who will benefit from arthroscopic procedures.

LABRAL DEBRIDEMENT VS REPAIR

The intrinsic nature of the acetabular labrum is to function in shock absorption, joint lubrication, and pressure distribution. This is especially significant in a major load-bearing joint such as the hip. Therefore, it is generally assumed that preservation and repair to keep the labrum intact is preferred to labral debridement or excision.

Espinosa et al retrospectively reviewed 60 cases of arthroscopy for femoroacetabular impingement. The patients were divided consecutively into 2 groups, with the first 25 patients undergoing labral debridement and the next 35 undergoing refixation. The groups were evaluated with Tonnis arthrosis scores and Merle d’Aubigne scores. At 2-year follow-up,
76% of patients in the resection group and 94% in the refixation group reported good or excellent results. Clinical scores were significantly better in the refixation group at both 1- and 2-year follow-up.29 Larson and Giveans31 reviewed 2 groups undergoing arthroscopy for pincer or combined pincer–cam lesions. One group was treated with labral debridement and the other with labral refixation with 1-year follow-up using the modified Harris Hip Score as a primary outcome measure. The postoperative modified Harris Hip Score for the group undergoing labral refixation was an average of 5 points greater than that of the group undergoing labral debridement. It was also noted that patients who underwent labral refixation subjectively reported good or excellent outcomes in 90% of cases, compared with 67% of labral debridment cases. With respect to the incidence of unsuccessful arthroscopic procedures, this number was also found to be greater in the debridement group.31

**Postoperative Adhesions**

Recent literature has identified other possible mechanisms of failure on evaluation of revision procedures.17,18 In addition to aforementioned causes of failure, Philippin et al19 identified postsurgical adhesions as a common cause for revision hip arthroscopy. In a review of 37 cases, they reported that adhesions were the primary cause of failure in 22 (59%) cases. Such adhesions were typically found at the site of previous labral repair and the capsule, in the area of greatest labral vascularity. It has been suggested that increased emphasis on early postoperative ROM may decrease to incidence of adhesions. A secondary cause of failure in this cohort was unaddressed instability, which was noted in 13% of the original arthroscopic procedures.19

**Intraoperative Complications**

The overall intraoperative complication rate associated with hip arthroscopy has been reported to be between 0.5% and 6.4%.32–36 The majority of these cases are due to transient neuropraxia of the pudendal, sciatic, or peroneal nerves as a result of excessive distraction of the joint and prolonged traction during surgery.32,34,35 Such neuropraxias may be preventable with implementation of a distraction force of less than 50 pounds for less than 2 hours, with a perineal post 7 to 9 cm in diameter.34 The majority of these neurological complications refrain from being long-term factors contributing to failure of the arthroscopic procedure. However, rarely have major complications been reported—with an incidence rate under 1%—to contribute to an unsuccessful surgery.34 Major complications included septic arthritis, osteonecrosis of the femoral head due to prolonged traction, and iatrogenic chondral scuffing.34,37 It has been postulated that iatrogenic chondral scuffing and intraoperative trauma from instrumentation are the most common sources of significant complication associated with hip arthroscopy, yet they are underreported.38 This makes it difficult to assess their role in failed hip arthroscopy and their contribution to the need for revision surgery. A serious concern that may lead to an unanticipated abrupt end to the procedure and potentially devastating sequelae is the threat of fluid extravasation leading to abdominal compartment syndrome. This is of greatest concern with longer operative times and extra-articular procedures, such as iliofemoral tendon release.34,39,40 These circumstances may permit irrigation fluid to leak into the extra-articular tissue, travel along the iliofemoral tendon and muscle, and collect in retroperitoneal and intraperitoneal cavities of the abdomen.39 Although rare, the operating surgeon must be aware of this potentially life-threatening complication.

**Conclusion**

The ability to perform arthroscopic hip surgery has provided orthopedic surgeons with a new tool to diagnose and treat a wide variety of pathologic conditions of the hip. As the number of procedures performed increases annually, so does the number of failed procedures. The ability to accurately diagnose the reasons for failure and treat them must increase as well. Operating surgeons must be diligent in their diagnosis and indications to achieve optimal results with this procedure. Future studies will help determine new avenues of treatment.

**References**
