

## Best Practices During Hip Arthroscopy: Aggregate Recommendations of High-Volume Surgeons

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**Purpose:** To survey surgeons who perform a high volume of hip arthroscopy procedures regarding their operative technique, type of procedure, and postoperative management. **Methods:** We conducted a cross-sectional survey of 27 high-volume orthopaedic surgeons specializing in hip arthroscopy to report their preferences and practices related to their operative practice and postoperative rehabilitation protocol. All participants completed the survey in person in an anonymous fashion during a meeting of the American Hip Institute. **Results:** All surgeons perform hip arthroscopy with the patient in the supine position, accessing the central compartment of the hip initially, using intraoperative fluoroscopy. All surgeons perform labral repair (100%), with the majority performing labral reconstructions (77.8%) and gluteus medius repairs (81.5%). There is variability in the type of anchors used during labral repair. Most surgeons perform capsular closure in most cases (88.9%), inject either intra-articular cortisone or platelet-rich plasma at the conclusion of the procedure (59%), and prescribe a postoperative hip brace for some or all patients (59%). There is considerable variability in rehabilitation protocols. All surgeons routinely prescribe postoperative heterotopic ossification prophylaxis to their patients, with most surgeons (88.9%) prescribing a nonsteroidal anti-inflammatory medication for 3 weeks. Forty percent of the respondents use the modified Harris Hip Score as the most important outcome measure. **Conclusions:** Consistent practices such as use of intraoperative fluoroscopy, heterotopic ossification prophylaxis, and labral repair skills were identified by surveying 27 hip arthroscopy surgeons at high-volume centers. Most of the surgeons performed routine capsular closure unless underlying conditions precluded capsular release or plication. The survey identified higher variability between surgeons regarding postoperative rehabilitation protocols and use of intra-articular pharmacologic injections at the end of the procedure. These data may provide surgeons with a set of aggregate trends that may help guide training, clinical practice, and research in the evolving field of hip arthroscopy.

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The first description of hip arthroscopy was published in 1931 by Burman,<sup>1</sup> with the first clinical applications of hip arthroscopy in the 1970s and 1980s.<sup>2</sup> The number of hip arthroscopy procedures performed in the United States has been increasing significantly over the past decade.<sup>3,4</sup> Advancements in diagnostic tools including magnetic resonance imaging have allowed more detailed detection of various hip pathologies.<sup>5,6</sup> In addition, developments in surgical instrumentation designed specifically for hip arthroscopy, as well as the development of new surgical techniques, have further enhanced treatment of intra-articular hip pathology.

Given the rapid expansion of hip arthroscopy, clinical evidence has not always been adequate to evaluate best practices related to hip-preservation procedures, specifically hip arthroscopy. Indeed, there can be a separation between clinical evidence and expert opinion. The design of this study was intended to aggregate the expert opinions of 27 surgeons regarding the best practices in hip arthroscopy. These opinions may be

based on a combination of knowledge of the evidence and personal experience. For most of the questions addressed in this study, there is a paucity of clear medical evidence. In such instances, best practices are often based on consensus of expert opinion.

The study purpose is to survey surgeons who perform a high volume of hip arthroscopy procedures regarding their operative technique, type of procedure, and postoperative management. We hypothesize that there is a clear lack of consensus between high-volume hip arthroscopists related to operative techniques and postoperative protocols.

## Methods

We conducted a cross-sectional survey of orthopaedic surgeons identified as high-volume surgeons in hip arthroscopy, who were in attendance at an open meeting of the American Hip Institute Study Group. The questionnaire is not a validated questionnaire or a measure of any outcome but rather represents a list of some of the commonly heard questions at hip arthroscopy educational venues. This article reports a descriptive analysis only and is not exhaustive but focuses on addressing common issues and practice trends for high-volume arthroscopists.

A high-volume surgeon is defined as a surgeon who performs more than 50 hip arthroscopy cases annually. The group included 27 surgeons who had case experience ranging from 50 to 5,000 hip arthroscopies performed annually. The questionnaire was composed of 8 questions regarding intraoperative and postoperative trends. The questions in our survey were by no means exhaustive but represent some of the questions that are commonly asked at hip arthroscopy courses and meetings. All participants completed the survey in person in an anonymous fashion. This study was determined to be institutional review board exempt because the survey was anonymous and confidential, with no identifiers linked to individual responses. Completion of the survey implies consent. The first page of the survey asked participants to provide consent before continuing on with the questionnaire.

We developed the study protocol in consultation with our statistics department. The statisticians indicated that in this format of study, it would not be appropriate to perform statistical analysis because the study reports the prevalence of best practices. It was believed that any more specific statistics would over-reach the scope of this study. An additional manuscript reporting high-volume surgeons' indications for hip arthroscopy has been submitted for publication and can serve as a supplemental reference and resource for clinicians.

## Results

Twenty-seven surgeons were invited to participate in the survey, with 100% completing the survey. All

**Table 1.** Types of Procedures Performed

| Procedure                          | No. of Surgeons | % of Surgeons |
|------------------------------------|-----------------|---------------|
| Joint access (central compartment) | 27              | 100           |
| Labral repair                      | 27              | 100           |
| FAI correction                     | 27              | 100           |
| Anchors                            |                 |               |
| Knotless                           | 16              | 59            |
| Knot tying                         | 8               | 30            |
| Both knotless and knot tying       | 3               | 11            |
| Capsular closure                   |                 |               |
| Every case                         | 3               | 11            |
| >50% of time                       | 10              | 37            |
| <50% of time                       | 11              | 41            |
| Never                              | 3               | 11            |

FAI, femoroacetabular impingement.

respondents (100%) were surgeon subspecialists in hip arthroscopy. The mean total number of hip arthroscopy procedures performed yearly was 917 (range, 50 to 5,000). The aggregate results were used to report aggregate recommendations for intraoperative and postoperative protocols. The specific topics addressed are shown in [Table 1](#).

## Positioning and Fluoroscopy

All surgeons perform hip arthroscopy with the patient in the supine position (100%) and gain access initially to the central compartment of the hip with the use of intraoperative fluoroscopy. One surgeon reported using initial peripheral access in select cases, depending on the location of pathology.

## Procedures Performed

The surgeons were asked to report, on average, how many times they perform labral repair to address a torn labrum ([Table 1](#)). The responses indicated a mean percent of 77% (range, 20% to 100%). All 27 surgeons (100%) reported performing labral repair in patients diagnosed with a torn acetabular labrum identified by preoperative magnetic resonance arthrogram and confirmed intraoperatively. The most common anchor type used for labral repair is knotless, by 16 surgeons (60%). Eight surgeons (29%) use knot-tying anchors, and 3 surgeons (11%) use a combination of both.

For patients presenting with femoroacetabular impingement (FAI) pathology, 100% of surgeons correct bony abnormalities arthroscopically, by use of acetabuloplasty or femoroplasty. Of the surgeons, 22 (81.5%) perform gluteus medius repairs arthroscopically and 21 (77.8%) perform labral reconstructions using allograft. Only 3 surgeons (11.1%) reported performing endoscopic hamstring repair.

## Capsular Management

All surgeons perform routine capsulotomy to gain access to the joint ([Table 2](#)). Capsular closure is

**Table 2.** Use of Capsular Closure

| Capsular Closure | No. of Surgeons | % of Surgeons |
|------------------|-----------------|---------------|
| Every time       | 3               | 11.1          |
| >50% of time     | 10              | 37.0          |
| <50% of time     | 11              | 40.7          |
| Never            | 3               | 11.1          |

performed by 3 surgeons (11%) in every case, whereas 3 surgeons (11%) reported never closing the capsule. Most of the surgeons (78%) based the decision to perform capsular closure on intra-articular pathology and underlying conditions, such as instability.

### Intra-Articular Postoperative Injection Use

Regarding intra-articular pharmacologic injections at the end of the procedure, 15 surgeons (55.6%) inject a local anesthetic into the joint at the end of the operation, 2 surgeons (7.5%) inject platelet-rich plasma (PRP) directly into the joint, and 10 surgeons (37%) do not inject anything into the joint on completion of the procedure (Table 3).

### Postoperative Bracing

Postoperatively, 16 surgeons (59.2%) prescribe a hip brace for some or all of their patients (Table 4). In all cases the specialized hip brace used was designed to limit hip flexion to 90° and control abduction. Eight surgeons (29.6%) routinely place their patients in a specialized hip brace. Another 8 surgeons (29.6%) place their patients in a hip brace in some but not all cases. Eleven surgeons (40.7%) never have their patients use a brace postoperatively. Among the surgeons whose patients do use a brace, 6 (22.2%) use the brace for protection when intra-articular procedures have been performed, such as labral repair, and 9 surgeons (33.3%) use the brace for protection of patients treated with a capsular closure or plication procedure. Of the 22 surgeons who perform gluteus medius repairs as part of their practice, 12 use the brace postoperatively to limit hip abduction. For those surgeons electing to use a brace postoperatively, the mean length of brace wear is 3.4 weeks (range, 2 to 6 weeks) until discontinuation is recommended based on individual progress. Twenty-five surgeons (92.5%) limit patient weight bearing for a mean period of 2.1 weeks (range, 0 to 6 weeks).

**Table 3.** Use of Intra-Articular Injections Intraoperatively

| Type of Injection    | No. of Surgeons | % of Surgeons |
|----------------------|-----------------|---------------|
| Local anesthetic     | 15              | 56            |
| Platelet-rich plasma | 2               | 7             |
| No injection         | 10              | 37            |

**Table 4.** Length of Bracing for Certain Types of Procedures

| Postoperative Bracing | No. of Surgeons | % of Surgeons |
|-----------------------|-----------------|---------------|
| Every time            | 8               | 30            |
| >50% of time          | 2               | 7             |
| <50% of time          | 6               | 22            |
| Never                 | 11              | 41            |

### Heterotopic Ossification Prophylaxis

All surgeons reported prescribing some form of heterotopic ossification (HO) prophylaxis for 3 weeks (Table 5). Twenty-four surgeons (89%) prescribe a nonsteroidal anti-inflammatory medication postoperatively, whereas 3 (11%) reported use of 325 mg of aspirin for the same period.

### Outcome Measures

Surgeons were asked to rank which outcome score they placed the most importance on when evaluating patients after hip arthroscopy (Table 6). Eleven (40.7%) responded that the modified Harris Hip Score is the most important outcome measure, followed by 6 (22.2%) who ranked patient satisfaction responses as the most important. Twenty respondents (74.1%) use the modified Harris Hip Score, followed by 15 (55.6%) who ask the patient if he or she would undergo the surgical procedure again.

## Discussion

Although we found consensus regarding certain operative and postoperative protocols, there was still some inherent variability among surgeons. The protocols in consensus are as follows: performing surgery with the patient in the supine position, using intraoperative fluoroscopy, initially gaining access to the central compartment by performing capsulotomy, performing labral repair using anchors, and prescribing prophylaxis for HO.

Pollard et al.,<sup>7</sup> in a randomized trial comparing the learning curves between supine and lateral positioning, found that the field orientation in the group using the lateral position was more difficult than that in the group using the supine position in the first 8 episodes. Although in the current literature there are no conclusive studies on patient positioning, familiarity and reproducibility observed with the supine position

**Table 5.** Type of HO Prophylaxis

| HO Prophylaxis | No. of Surgeons | % of Surgeons | Duration, Range, wk |
|----------------|-----------------|---------------|---------------------|
| NSAID          | 24              | 89            | 3-6                 |
| Aspirin        | 3               | 11            | 3-4                 |

HO, heterotopic ossification; NSAID, nonsteroidal anti-inflammatory drug.

**Table 6.** Most Important Patient-Reported Outcome Measures

| Most Important Outcome Measure | No. of Surgeons | % of Surgeons |
|--------------------------------|-----------------|---------------|
| mHHS                           | 11              | 41            |
| Patient satisfaction           | 6               | 22            |
| HOS-SSS                        | 2               | 7             |

HOS-SSS, Hip Outcome Score—Sport Specific Subscale; mHHS, modified Harris Hip Score.

allow proper application of traction, as well as adequate visualization and proper instrument positioning, for the treatment of FAI even if such procedures are performed on a standard fracture table.<sup>8</sup> All surgeons surveyed performed hip arthroscopy with the patient in the supine position and gained access initially through the central compartment using intraoperative fluoroscopy as described in the literature.<sup>9,10</sup>

Ruiz-Suarez et al.<sup>11</sup> have shown the validity of anchors specifically designed for hip arthroscopy through biomechanical testing. Although there has not been a specific comparison of knotless versus knot-tying anchors regarding hip arthroscopy, these anchors have been extensively studied in the shoulder. Extrapolating from the shoulder literature, numerous studies have shown a higher load to failure for knotted anchors, with failure most commonly occurring at the suture-tissue interface.<sup>12,13</sup> Hip biomechanics translate into different forces on the labrum in comparison with the shoulder; therefore further research needs to focus on the mechanical properties of both types of suture anchors as they specifically relate to the hip. With increased attention placed on hip-specific instrumentation, our study shows that the most common type of anchor used to perform labral repair was a knotless design (60% of surgeons) compared with 29% of surgeons who used a knot-tying design.

Biomechanical studies have shown the stabilizing forces of the iliofemoral ligament and other capsuloligamentous structures (pubofemoral and ischiofemoral ligaments and zona orbicularis) in and around the hip.<sup>14-18</sup> Domb et al.<sup>19</sup> in a recent systematic review suggested that an unrepaired capsulotomy may compromise hip stability, causing micromotion in the joint. Although the role of the capsule continues to be studied and defined, hip arthroscopy surgeons should become facile with arthroscopic repair or plication techniques to restore proper capsular integrity and tension when indicated.<sup>20</sup> To gain access to the hip joint, a routine capsulotomy is needed, but the majority of surgeons surveyed do not perform capsular closure routinely, specifically 78% of the total cohort.

The use of intra-articular anesthetics after arthroscopic surgery is an area of concern. The debate in the current literature is based on the cytotoxic effect on

chondrocytes provoked by the most common local anesthetic used.<sup>21</sup> The use of PRP preparations in hip arthroscopy is gaining popularity based on PRP's properties.<sup>22</sup> In a blinded randomized clinical trial comparing the use of PRP versus a saline solution control postoperatively, Giordano and Snibbe<sup>23</sup> found that the use of PRP may decrease postoperative ecchymosis and edema and improve early outcomes for patients with FAI. Our study shows that 55.6% of the surgeons inject local anesthetics at the end of the procedure, 2 surgeons (7.5%) inject PRP, and 37% of the surgeons do not inject anything into the joint.

The use of a specialized hip brace postoperatively is indicated during the initial phase to limit range of motion to protect the integrity of repaired tissue from possible postoperative impingement; usually, flexion is limited to 90° and rotation, extension, abduction, and adduction are limited to 0°. Stalzer et al.<sup>24</sup> and Edelstein et al.<sup>25</sup> recommended the use of a brace for 10 days after surgery, whereas Domb et al.<sup>26</sup> suggested use of a brace for between 2 and 8 weeks depending on the procedure performed. Enseki and Kohlrieser<sup>27</sup> noted that the length of time for brace use is not widely agreed on. We found that 59.2% of surgeons place some or all of their patients in a specialized hip brace, and for those surgeons electing to use a brace postoperatively, the mean length of brace wear is 3.4 weeks.

The incidence of HO after hip arthroscopy with the use of prophylaxis has been shown to be less than 1.0% to 11.5% in the literature.<sup>28-30</sup> In the current literature, we found prophylaxis times ranging from 7 days to 30 days, with a period of up to 3 weeks being the most common period used for prophylaxis against HO.<sup>31-33</sup> All surgeons in our study reported that they use a protocol for prophylaxis in all patients. Twenty-four surgeons (89%) prescribe a nonsteroidal anti-inflammatory medication postoperatively, whereas 3 (11%) prescribe 325 mg of aspirin for 3 weeks. To our knowledge, this study represents the first investigation of intraoperative and postoperative aggregate recommendations after having surveyed a group of high-volume arthroscopy surgeons, followed by a discussion of current literature available, to identify practice trends and identify areas for further research.

### Limitations

Although it is possible that bias could be introduced by surgeons self-selecting to attend an open meeting, it was our intent that we would not have any input into the selection of the survey recipients. It was further our intent that this method would avoid any bias being directly introduced by us. We developed the study protocol in consultation with our statistics department. The statisticians indicated that in this format of study, it would not be appropriate to perform statistic analysis

because the study reports the prevalence of best practices. It was believed that any more specific statistics would over-reach the scope of this study. The questionnaire is not a validated questionnaire or a measure of any outcome but rather represents a list addressing common questions encountered at high-level arthroscopy meetings. It is by no means exhaustive, but because these questions arise at a high frequency at meetings, we surmise that the readers of *Arthroscopy* will be interested in the responses of high-volume hip arthroscopists.

## Conclusions

Consistent practices such as use of intraoperative fluoroscopy, HO prophylaxis, and labral repair skills were identified by surveying 27 hip arthroscopy surgeons at high-volume centers. Most of the surgeons performed routine capsular closure unless underlying conditions precluded capsular release or plication. The survey identified higher variability between surgeons regarding postoperative rehabilitation protocols and use of intra-articular pharmacologic injections at the end of the procedure. These data may provide surgeons with a set of aggregate trends that may help guide training, clinical practice, and research in the evolving field of hip arthroscopy.

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