64 Evaluating the Outcome of Hip Preserving Procedures: Patient Function, Satisfaction, and Impairment

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The advancement of hip arthroscopic procedures has contributed to improvements in the identification and treatment of hip disorders. While originally used for diagnosis and debridement of acetabular labral pathology, arthroscopy is now frequently used to perform complex procedures such as osteochondroplasty for treatment of abnormal bony morphology. As the complexity of arthroscopic procedures continues to increase, assessing the success of these procedures is of utmost importance to determine appropriate treatment plans for patients. Given that hip arthroscopy is a relatively new procedure for the management of hip disorders, evaluation of long-term patient function and satisfaction following surgery is limited. In addition, few measurement tools have been validated to specifically assess outcomes of patients undergoing these procedures. Many hip arthroscopy patients are younger and more active, and have different goals and expectations than patients undergoing more traditional open hip procedures. As such, the evaluation of outcomes for hip arthroscopy patients is restricted by the limitations of the measurement tools available. Nonetheless, the available evidence derived from outcome instruments derived from older patients demonstrates that many hip preservation procedures performed via arthroscopy lead to marked improvement in pain and function for many patients. This chapter will review patient function, satisfaction, and impairment following hip arthroscopy, including potential confounding variables which may improve or limit the success of these procedures. Understanding what factors contribute to good and poor outcomes is essential for surgeons to plan appropriate surgical options for future patients.

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Patient Function and Impairment Following Hip Arthroscopy: Reported Results Based on Common Outcome Instruments

The Modified Harris Hip Score

As patients elect to undergo hip arthroscopy primarily to return to full, pain-free function, quantification of patient function pre- and post-surgery is central to the evaluation of the success of arthroscopic surgery. Though multiple outcome instruments have been employed to assess patient-reported function following hip arthroscopy, most studies have utilized the Modified Harris Hip Score (MHHS), which is an adaptation of the original Harris Hip Score designed for patients undergoing hip arthroplasty [1–14]. The modified score includes items assessing pain, impairments during gait (limp, assistive devices), walking distance, and the ability to climb stairs, put on socks and shoes, sit, and use public transportation. Items on the original Harris Score relating to deformity and range of motion have been omitted [15]. In calculating the MHHS, the total of all items is multiplied by a factor of 1.5 to yield a total possible score of 100 points. The MHHS has been used to assess outcomes following hip arthroscopy for patients of all ages and ranges of physical abilities. As many of these patients are young and active without chronic disabling hip disease, a ceiling effect has been commonly reported for the MHHS. Despite this, a plethora of information regarding patient function following hip arthroscopy is available in the form of MHHS scores, allowing direct comparison between studies as well as the opportunity to combine data from different studies to examine comprehensive trends.

Patient outcomes have been reported using the MHHS for up to 10 years after arthroscopic treatment of labral derangement in hips without bony abnormalities [2–14, 16]. In these studies the MHHS has increased from an average of 59 points pre-surgery to 82 points post-surgery, a 39 % improvement. When examining short term (1–3 years) [2, 4, 7, 8, 10, 13, 15], midterm (3–5 years) [9, 11, 14, 16], and

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long term (5–10 years) [3, 5, 6, 12] outcomes individually, similar patterns of improvement have been reported. Studies examining short term functional outcomes reported improvements of 38 %. MHHS scores increased from an average of 60 points to 82 points, with 80 % of outcomes rated as good to excellent. Midterm outcomes were slightly inferior, with scores increasing from 55 points to 75 points; however, only 56 % were rated as good to excellent. Superior outcomes were observed for the three studies reporting long term outcomes. MHHS scores increased from 62 points to 90 points, a 45 % improvement. Sixty-two percent of outcome scores were rated as good to excellent in this cohort. In a single study assessing outcomes following arthroscopic labral reconstruction using an iliotibial band graft, MHHS scores were shown to improve from 62 points to 85 points, suggesting this technique may be a viable alternative to arthroscopic debridement of labral tears. Based on these findings, patient-reported pain and function is improved following hip arthroscopy for labral pathology without bony abnormalities.

For patients undergoing hip arthroscopy for femoroacetabular impingement (FAI), MHHS scores have been reported up to 4 ½ years following surgery [1, 17–36]. Overall, the total score was shown to increase from 64 points to 87 points, a 37 % improvement. Improvements reported for short term (1–3 years) outcomes (64–88 points; 38 % increase) [1, 18, 21–24, 26, 27, 29, 30, 32–34, 36–39] were identical to those reported for midterm (3–5 years) outcomes (63–86 points; 37 % increase) [17, 19, 20, 25, 28, 31, 35, 40]. Additionally, 77 % of patients reported good to excellent outcomes. Age at time of surgery may play a role in postoperative outcomes scores for patients undergoing osteochondroplasty. For the three studies examining an adolescent population [29, 31, 32], postoperative MHHS scores averaged 87 points at 1–3 years following surgery, compared to an average of 78 points at 2–3 years following surgery for the two studies examining patients greater than 50 years of age. In addition to age, whether a labral repair or resection was performed in concert with osteochondroplasty was shown to affect postoperative MHHS scores. For patients with concomitant labral repair, MHHS scores improved from 60 points to 94 points, while those with labral resection improved from 63 points to 88 points. Additionally, only 68 % of patients with labral resection reported good to excellent outcomes, compared to 92 % with repair. In general, clinical outcomes support the use of hip arthroscopy for patients with symptomatic FAI.

There is limited data documenting the outcome of arthroscopic procedures for treatment of conditions other than FAI and labral repair (e.g. synovial chondromatosis, ligamentum teres ruptures). In a cohort of patients presenting with synovial chondromatosis, only half (48 %) reported good to excellent outcomes at an average of 5 years following surgery [41]. This sub-group was shown to have only grade I or II cartilage lesions of the hip at the time of surgery, suggesting arthroscopy for synovial chondromatosis may be an effective in the setting of limited joint degeneration, but not in those with more advanced joint disease. More favorable outcomes were reported following arthroscopic treatment of traumatic ruptures of the ligamentum teres. At an average of 29 months following surgery, MHHS scores were shown to improve from 43 points to 90 points. In addition, 96 % of patients reported a greater than 20 point improvement in pain and function. While these two examples provide preliminary information which may be useful in designing treatment plans for patients, more research is needed to assess the efficacy of arthroscopic procedures for the treatment of hip pathologies other than labral derangement and FAI.

As stated previously, a ceiling effect has been observed for the MHHS; therefore, scores for higher functioning patients may be inflated compared to lower functioning patients. In fact, studies which examined hip arthroscopy for labral debridement without bony abnormality in an athletic population ($n=3$) reported higher postoperative scores (94 points) compared to all other studies (80 points) ($n=13$), regardless of time from surgery. Specifically comparing 10-year outcomes after arthroscopy performed by the same surgeon, MHHS scores reported for athletes (96 points) were higher than non-athletes (81 points). In contrast, there was no difference in overall postoperative MHHS scores for an athletic population (88 points; $n=9$) compared to others (86 points; $n=13$) for studies which examined hip arthroscopy for femoroacetabular impingement. Therefore, activity level of patients should to be taken into account when examining outcomes following hip arthroscopy for labral debridement without bony abnormality.

Other confounding factors have been shown to significantly affect postoperative MHHS scores following hip arthroscopy with or without bony abnormality. The presence of concomitant chondral pathology has been identified as an independent predictor of poor outcome following hip arthroscopy [3, 15, 17]. Patients with arthritis were 2.5 times more likely to have a poor outcome compared to patients without arthritis at an average of 4 years post-surgery [17]. For patients 8 years following hip arthroscopy, the presence of arthritis at the time of surgery was the strongest predictor of poor outcome, with only 19 % reporting good to excellent results using the MHHS [3]. Secondary gain issues (disability, potential litigation, worker's compensation) were also shown to be negative predictors of outcome following hip arthroscopy [4, 17]. Patients with issues involving secondary gain were found to have poorer outcomes and were less likely to return to their prior activity level following surgery. In fact, no patient with secondary gain issues in either study reported a good to excellent outcome. Younger age was

shown to be an independent predictor of good to excellent outcome. Patients less than 39 years of age were 7 times more likely to report good to excellent outcomes compared to their elder counterparts [17]. As a result, chondral pathology, disability status, and patient age should to be taken into account when interpreting outcomes for patients following hip arthroscopy for labral pathology.

The Nonarthritic Hip Score

The Nonarthritic Hip Score (NAHS) was developed to assess patients performing at a higher level of functioning. The NAHS assesses pain during daily activities; symptoms of joint catching, instability, and stiffness; function during daily activities; and function during recreation and sporting activities [42]. One study employed the NAHS for patients undergoing hip arthroscopy for labral tear without bony abnormality. At 3 years following surgery, total NAHS scores improved from 61 points to 78 points for all types of labral derangement. In this group of patients, the presence of chondral lesions at the time of surgery was shown to negatively affect outcome. For patients undergoing hip arthroscopy for femoroacetabular impingement, NAHS scores improved 38 %, from an average of 61 points to 83 points [1, 22, 25, 35–40]. Postoperative NAHS scores reported for short-term (1–3 years; 84 points) were similar to those reported for midterm outcomes (3–5 years; 81 points).

Less information exists regarding potential confounding factors for patient outcomes using the NAHS compared to the MHHS. A single study examined the use of a computer navigation system for improving surgical performance during osteochondroplasty [39]. At an average of 27 months following surgery, NAHS scores for patients who underwent surgery with navigation (90 points) were slightly higher than without navigation (82 points). These results suggest improved surgical technique during osteochondroplasty may positively affect patient outcome as assessed with the NAHS. In contrast, the presence of chondral pathology at the time of surgery appears to have a negative effect on the postoperative NAHS score. Scores for studies examining outcomes for patients with chondral pathology ($n = 3$; 77 points) were less than those for patients without chondral pathology ($n = 8$; 85 points). Interestingly, while a slight difference in NAHS score was observed between athletes (87 points) and others (81 points) following osteochondroplasty, athletes received virtually the same average outcome score whether assessed with the NAHS (87 points) or the MHHS (88 points). Given that the NAHS was created to address some of the ceiling effects seen by scores like the MHHS, use of the total score on NAHS for reporting outcomes may not offer any additional information from the total score of the MHHS. More detailed understanding of outcomes for athletic populations may be best accomplished by reporting average scores for each domain of each measurement tool.

Instruments for Pain Measurement: The Visual Analog Scale

Pain is one of the main reasons patients elect to undergo arthroscopic procedures for hip pathology. Although scores such as the MHHS and the NAHS both have questions which specifically address a patient's level of pain, most studies only report the total outcome score, which also includes functional questions. Thus, the extent to which joint pain is specifically relieved by arthroscopic surgery must be assessed through additional investigation. A handful of studies of patients undergoing hip arthroscopy for FAI have used the Visual Analog Scale (VAS) to assess pain levels independent of hip function [20, 37, 39, 40]. Patients were asked to rate their pain on a scale of 1–10, with 10 being the worst pain. Pain was shown to improve from an average of 5.7 presurgery to 1.6 at 1–3 years following surgery. The use of computer navigation during surgery may result in greater improvements in pain [39]. At an average of 27 months following surgery, patients who underwent surgery with navigation reported pain scores of 1 compared to scores of 2 for those without navigation. In addition, those patients for whom a labral repair was performed reported slightly lower pain scores (0.7) compared to those for whom labral debridement was performed (1.7) [20]. Overall, these results suggest osteochondroplasty performed via hip arthroscopy results in pain relief for patients.

Patient Satisfaction

Patients who elect to undergo arthroscopic surgery for treatment of hip disorders do so for a variety of reasons—pain relief, restoration of joint mobility and function, and/or return to recreational and sporting activities. As such, available measurement tools may not accurately address all constructs which are important in determining a good or poor outcome for each patient. To compensate for this, assessing patient satisfaction in addition to patient function can provide valuable information regarding overall surgical outcomes. For patients undergoing hip arthroscopy for labral derangement without bony abnormalities, few studies have reported patient satisfaction rates [3–5, 9]. Overall, 75 % of patients reported being satisfied with their outcomes following surgery. Studies describing short-term (1–3 years) patient satisfaction rates report similar rates (75 %) [4, 43] as those reporting midterm (3–5 years) satisfaction rates (67 %) [9] and long term (5–10 years) satisfaction rates (82 %) [3, 5].

For patients undergoing hip arthroscopy for FAI, numerous authors have reported patient satisfaction rates [17, 22–25, 27, 31, 35, 36]. Short term satisfaction rates (1–3 years; 80 %) were slightly lower than midterm satisfaction rates (3–5 years; 89 %) as a whole. In general, the majority of patients appear satisfied with their outcome following arthroscopy.

Certain factors were found to affect patient satisfaction after hip arthroscopy. The presence of articular cartilage degeneration at the time of surgery was shown to negatively affect patient satisfaction [3, 5]. Similarly, for patients involved in disability proceedings, reduced satisfaction rates (50 %) were reported when compared to patients not involved in such proceedings (84 %) [4]. Therefore, while the evidence is limited, these variables should be taken into account when interpreting patient satisfaction after hip arthroscopy.

Conclusion

As arthroscopic procedures for hip pathologies are still in their infancy compared to other joints, assessing the success of these procedures is paramount to advancing treatment techniques. For patients with labral derangement with or without concomitant bony abnormalities, the evidence suggests patient function is improved and pain is reduced following surgery. In addition, the majority of patients report being satisfied with their outcomes. However, there is a subset of patients for whom arthroscopic treatment of their hip disorder is not successful. For these patients, the presence of chondral defects at the time of surgery is the most common cofounding factor. Patient age and level of functioning may also affect postoperative pain and function. Understanding the goals of each patient prior to surgery and creating a treatment plan which best addresses those goals and expectations is paramount to successful outcomes.

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