

Midterm Outcomes and Satisfaction After Hip Arthroscopy Are Associated With Postoperative Rehabilitation Factors

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Background: Arthroscopic hip-preservation surgery is commonly performed to address nonarthritic sources of hip pain in young, active individuals. However, there is little evidence to support postoperative rehabilitation protocols, including the most appropriate frequency and length of individual formal physical therapy sessions. There is also a lack of information to look at patients' perceived value of their home program/self-practice in relation to outcomes.

Purpose: To investigate postoperative rehabilitation factors after hip arthroscopy related to formal physical therapy and home program/self-practice and their correlation with patient outcomes and satisfaction.

Study Design: Cohort study; Level of evidence, 3.

Methods: A total of 125 patients who underwent hip arthroscopy for femoroacetabular impingement syndrome and a labral tear (75 men) were included. The mean age was 34.6 ± 14.4 years, and the mean follow-up time was 4.9 ± 1.6 years. Hip Outcome Score–Activities of Daily Living subscale (HOS-ADL) scores, overall satisfaction scores, and factors related to supervised physical therapy and home program/self-practice were collected. Correlations between continuous variables and differences in the length of individual formal physical therapy and patients' rating of the importance of their home program/self-practice between those who would and those who would not undergo surgery again were assessed.

Results: The frequency and length of individual formal physical therapy sessions were significantly correlated with postoperative HOS-ADL scores ($r = 0.22$, $P = .014$; and $r = 0.24$, $P = .007$, respectively) and level of satisfaction ($r = 0.24$, $P = .007$; and $r = 0.21$, $P = .02$, respectively). The length of individual formal physical therapy sessions was significantly greater in those who noted they would undergo surgery again (35.3 vs 26.3 ; $P = .033$). A significant correlation was identified between the rating of the importance of their home program/self-practice and postoperative HOS-ADL scores ($r = 0.29$; $P = .001$) and their level of satisfaction ($r = 0.23$; $P = .009$). There was a significant difference in the rating of the importance of their home program/self-practice between those who would undergo surgery again and those who would not (8.9 vs 7.8 ; $P = .007$).

Conclusion: Surgeons and physical therapists should emphasize the value of home program/self-practice when it comes to outcomes and may want to encourage their patients to participate in more frequent, longer, formal physical therapy sessions.

Keywords: hip arthroscopy; physical therapy; self-practice; home program

Arthroscopic hip-preservation surgery is commonly performed to address nonarthritic sources of hip pain in young, active individuals.^{8,18,20} These individuals often want to return to a high activity level after surgery. Postoperative rehabilitation after hip arthroscopy for femoroacetabular impingement (FAI) syndrome (FAIS) is felt to be essential for improved patient outcomes.^{3,4,7,9,10,13,16,22,26} A comprehensive rehabilitation program includes both formal in-clinic physical therapy and independent participation in self-directed exercises performed outside the clinic.

Achieving optimal postsurgical outcomes often requires commitment to the rehabilitation protocol.^{7,16}

However, there is little evidence to support postoperative rehabilitation protocols, including the most appropriate frequency and length of individual formal physical therapy sessions.¹³ A home program or self-practice of exercise completed outside formal physical therapy may be an important component of postoperative rehabilitation.^{2,3} There is also a lack of information to look at patients' perceived value of their home program/self-practice in relation to outcomes. Postoperative rehabilitation after hip arthroscopy for FAIS requires not only a physical commitment but also an emotional commitment throughout the postoperative rehabilitative process.¹⁹ It is unknown whether there are better outcomes in those

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patients who value their home program/self-practice and spend more time in physical therapy.

The purpose of the study was to investigate postoperative rehabilitation factors related to formal physical therapy and home program/self-practice and their correlation with patient outcomes and satisfaction. It was hypothesized that there would be a positive correlation between time spent in formal physical therapy and the patient's perceived value of one's home program/self-practice as well as one's postsurgical outcomes and satisfaction.

METHODS

After receiving study approval from a local institutional review board, we considered the data from patients with a clinical presentation consistent with FAIS and a labral tear who underwent arthroscopic hip surgery by a single surgeon (E.R.) between January 2013 and June 2016. Patients had a medical history taken, physical examination, and imaging using plain radiographs and magnetic resonance imaging arthrography. The radiographic definition of cam-type FAI was an alpha angle greater than 55° or an abnormal femoral head-neck offset. Pincer-type FAI was radiographically defined as a lateral center-edge angle greater than 40°, or a prominent ischial spine was observed, with or without a positive crossover sign. Conditions contraindicated for hip arthroscopy included patients with primary lumbopelvic pathology, severe hip arthrosis, severe dysplasia (lateral center-edge angle, <20°), femoral head fracture, congenital or developmental hip disease (eg, residual deformation due to Perthes disease), and slipped capital femoral epiphysis, heterotopic ossification, or neurologic conditions. Inclusion criteria specific to this study were patients older than 18 years of age having had a primary hip arthroscopy for FAIS and labral tears with a complete record for review. Patients were excluded from this study if they had pathologies and/or procedures in addition to FAIS and a labral tear, including articular cartilage damage requiring microfracture, extra-articular conditions, and/or arthritis in the hip and knee. Patients were also excluded if they had active workers' compensation claims and incomplete information.

Surgical Technique

The surgical technique has been previously described; it utilized a supine position with arthroscopic visualization to

confirm and treat FAI, labral tears, cartilage defects, ligamentum teres compromise, and subsapine impingement.¹

Rehabilitation

The physical therapy protocol is shown in Appendix Figure A1 and included 1 physical therapy visit to review protocol before discharge from the hospital. At discharge, patients were instructed to begin both supervised physical therapy at the clinic of their choice and daily home/self-exercise. All patients were educated to begin immediate postoperative weightbearing as tolerated using crutches for the first 2 weeks as needed. The rehabilitation protocol included strengthening exercises and limited range of motion (ROM). Patients advanced gradually for the next 4 weeks to full ROM and muscle-strengthening exercises. Patients started to perform endurance exercises and return to sports (without pivoting movements) between 9 weeks and 4 months after the procedure.

Data Acquisition and Postoperative Follow-up

Patient data (sex, age, and operated side), preoperative diagnosis, intraoperative diagnosis, and the performed surgical procedures were collected from the patient's medical records. Postoperatively, patients were contacted via phone and asked to provide the following information: (1) Hip Outcome Score–Activities of Daily Living subscale (HOS-ADL) score; (2) overall satisfaction with their current hip condition on a scale of 1 to 100, with 100 being “most satisfied”; (3) a yes/no response to the question “Would you undergo hip surgery again?”; (4) weekly frequency of formal physical therapy sessions; (5) duration of each physical therapy session (minutes); and (6) perception of the importance of home program/self-practice on a scale of 1 to 10, with 1 being “not important at all” and 10 being “very important.”

Statistical Analysis

All statistical analysis was performed using the IBM SPSS Version 25.0 statistical software. Association between categorical variables was assessed using the chi-square test or Fisher exact test where appropriate, while association between scale or ordinal variables was studied using the independent-samples *t* test, Mann-Whitney test, or Kruskal-Wallis test. Spearman correlation coefficient was used to study the association between continuous variables.

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Ethical approval for this study was obtained from Sourasky Medical Center, Tel Aviv, Israel (No. 0402-13 TLV).

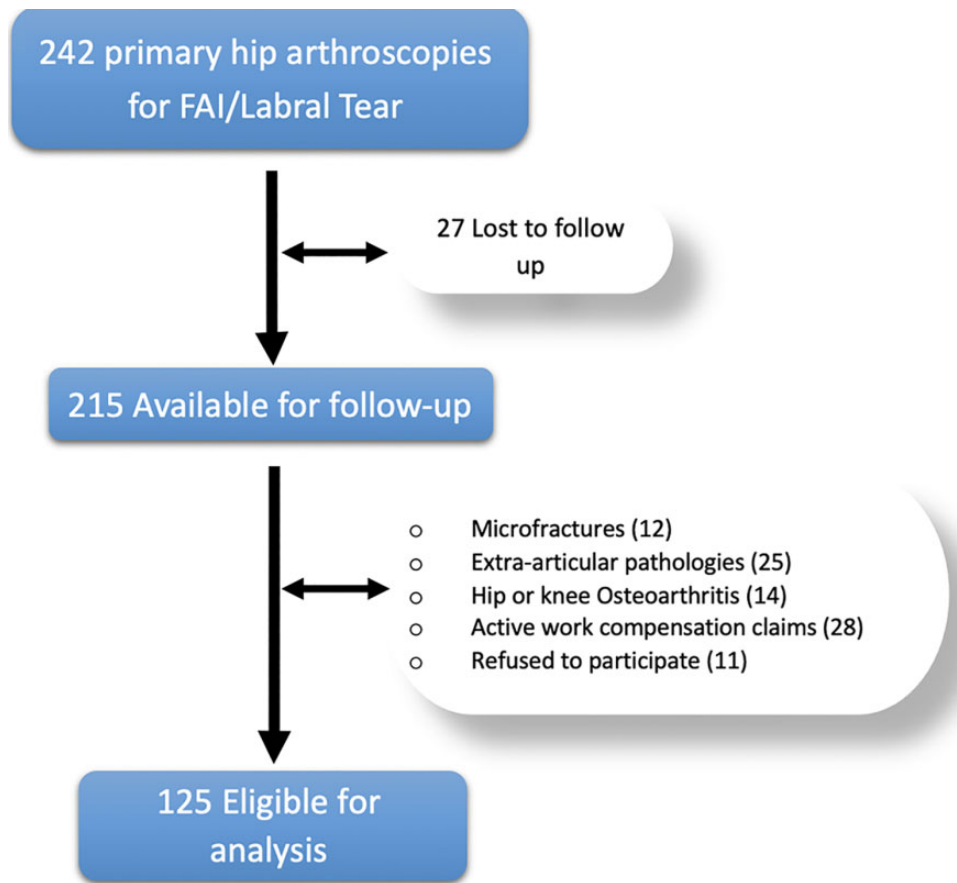


Figure 1. Flowchart of patient recruitment and participation based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. FAI, femoroacetabular impingement.

The satisfaction score was not normally distributed and therefore divided into 2 groups: complete satisfaction (grade 100) and incomplete satisfaction (grade 99 or less) in order to allow for multivariate analysis.

All statistical tests were 2-tailed. $P < .05$ was considered statistically significant.

RESULTS

Of 136 available patients, 125 (92%) were included in the analysis. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart is presented in Figure 1.

Patient characteristics, sex, age, mean follow-up time, and procedures performed are presented in Table 1. The mean postoperative HOS-ADL score, mean level of satisfaction with their hip, perceived importance of home program/self-practice, frequency of formal physical therapy session (sessions/week), and length of physical therapy session (minutes) are presented in Table 2.

The frequency and length of individual formal physical therapy sessions were significantly correlated with postoperative HOS-ADL scores ($r = 0.22, P = .014$; and $r = 0.24, P = .007$, respectively) and level of satisfaction

TABLE 1
Patient Characteristics, Mean Follow-up Time, and Procedures Performed^a

| | Value |
|-----------------------------|---------------------|
| Mean age | 34.6 ± 14.4 (17-67) |
| Sex | |
| Male | 75 (60) |
| Female | 50 (40) |
| Mean follow-up time, y | 4.9 ± 1.6 (2-7.5) |
| Would undergo surgery again | |
| Yes | 104 (83) |
| No | 21 (17) |
| Procedures | |
| Labral repair | 125 (100) |
| Femoral neck osteoplasty | 106 (84.8) |
| Rim trimming | 95 (76) |

^aData are reported as mean ± SD (range) or n (%).

($r = 0.24, P = .007$; and $r = 0.21, P = .02$, respectively). Also, the length of individual formal physical therapy sessions was significantly greater in those who noted they would undergo surgery again (35.3 vs 26.3; $P = .033$). A significant correlation was also identified between the rating of the importance of their home program/self-

TABLE 2

Postoperative Outcome Measures and Patient Responses

| Outcome Measure | Mean \pm SD (Range) |
|---|--------------------------|
| Postoperative HOS-ADL score | 84.0 \pm 20.7 (22-100) |
| Overall satisfaction with hip (1-100) | 80.7 \pm 26.1 (1-100) |
| Importance of home program (1-10) | 8.7 \pm 2.3 (1-10) |
| Frequency of formal physical therapy, sessions/wk | 3 \pm 1.4 (1-6) |
| Length of formal physical therapy session, min | 33.9 \pm 18 (10-90) |

practice and postoperative HOS-ADL scores ($r = 0.29$; $P = .001$) and the level of satisfaction ($r = 0.23$; $P = .009$). Also, there was a significant difference in the rating of the importance of their home program/self-practice between those who would undergo surgery again and those who would not (8.9 vs 7.8; $P = .007$).

DISCUSSION

This study found the frequency and length of individual formal physical therapy sessions, as well as patient perception of the importance of one's home program/self-practice, to be important factors in self-reported outcomes after hip arthroscopy for FAIS. Specifically, more frequent and longer individual formal physical therapy sessions correlated with better outcomes. Also, the higher the patient's rating for the importance of home exercise/self-practice, the better the outcomes and level of satisfaction.

This study is in agreement with previous work that supports formal physical therapy after hip arthroscopy for FAIS.^{3,26} However, there is little research to guide postoperative rehabilitation.^{4,12,13} Generally, there is a progression from passive ROM, followed by gradual strengthening, to functional neuromuscular training and endurance.^{7,13,16,22} This includes protecting healing tissue as a first priority in the early phase of rehabilitation. After this time, rehabilitation is focused on progressive exercises to allow the patient to achieve normal ROM, improve strength, progress in joint loading, and return to sport-specific exercise.^{7,13,16,22} A randomized controlled trial found that those with structured postoperative physical therapy had better short-term outcomes than controls.² The FAI rehabilitation (FAIR) protocol described included 6 formal physical therapy visits that were 30 minutes in length over the course of 14 weeks.² This is consistent with a survey of Scandinavian physical therapists who recommend 4 formal physical therapy visits per month for postoperative rehab.²⁶ The FAIR trial also included individualized manual therapy with trigger point massage, lumbar spine mobilization, and education and counseling in the progression of home, aquatic, and gym exercises, as well as graduated return to sport and physical activity.² The results of the current study—that more frequent, longer, formal physical therapy sessions correlated with better outcomes—may support the benefit of individualized manual therapy, education, and counseling. Longer, more frequent physical therapy sessions may be particularly valuable

after the period of protected healing when the physical therapist can help patients progress in functional neuromuscular training and counsel them in return to sports.

A potential added value of formal physical therapy is informal counseling as the therapist encourages, supports, and sets goals with the patient over the months of therapy. Counseling may be a point of interest given the role that mental health issues may play in hip arthroscopy outcomes.¹⁹ In individuals undergoing hip arthroscopy for nonarthritic hip pathologies, the prevalence of depression was found to be as high as 28% and negatively affected 1- and 2-year outcomes.^{19,24} A biopsychosocial model has been used in the rehabilitation of patients after anterior cruciate ligament reconstruction (ACLR) with interventions that included self-advocacy goal setting, positive self-talk, and the development of a social support network.^{5,15,17,23} In the ACLR population, higher rates of exercise compliance and effort were found when interventions included self-advocacy goal setting and positive self-talk.²³ Additionally, a study by Tjong et al²⁵ found self-motivation, optimism, strong social support, and appropriate goal setting to positively affect return to sport after hip arthroscopy for FAIS. During formal physical therapy sessions after hip arthroscopy for FAIS, counseling with goal setting, encouragement, and social support occurred and may help to explain why more frequent, longer, formal physical therapy sessions correlated with better outcomes.

Commitment to and compliance with home programs or self-practice of exercise are important for improved outcomes.¹¹ Positive associations between adherence to ACLR programs and clinical outcomes have been documented in several studies.^{6,14,21} This is consistent with the results of this current study that found the higher the patients' perception for the importance of home program/self-practice, the better the outcome after hip arthroscopy for FAIS.

Compliant patients may be more driven to regain function and return to sports, therefore putting more effort in their program. Patients who are not compliant may have possible psychological or social factors that negatively affect outcomes.¹⁴ Therefore, it may be that more frequent, longer, formal physical therapy sessions indicate a high perceived importance of self-practice. In turn, this may indicate high compliance with a home program/self-practice.

Limitations

The major limitation of this study was that it was a retrospective study that relied on patient recall for the data and did not directly measure function. It should be noted that patients were given a protocol to help standardize rehabilitation. These results are also limited to a single surgeon. However, the physical therapy was received at multiple locations. Therefore, the frequency of visits and length of individual physical therapy sessions may vary considerably from clinic to clinic and be dependent on regional, insurance-related, and geographic issues. Despite these limitations, to our knowledge, this is the first study, with midterm follow-up, that investigated the frequency and length of individual formal physical therapy sessions, as

well as patient perception of the importance of home program/self-practice, and their relation to patient outcome after hip arthroscopy for FAIS.

CONCLUSION

This study found patient perception for the importance of home program/self-practice and the length and frequency of individual physical therapy sessions to be important factors in self-reported outcomes after hip arthroscopy for FAIS. Specifically, the higher the patient's rating for the importance of home exercise/self-practice, the better the outcomes and levels of satisfaction. As it relates to formal physical therapy, longer and more frequent individual sessions were related to better outcomes. Therefore, surgeons and physical therapists should emphasize the value of home program/self-practice in outcome and may want to encourage their patients to participate in more frequent, longer, formal physical therapy sessions.

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General guidelines

- Anterior hip pain is expected and pertinent to the soft tissue healing process. Stretching should be avoided at this time in order to allow physiological soft tissue healing.
- First 4 weeks: avoid passive extension stretching, gradual, painless progress through the rest of the ROM.
- Employ soft tissue mobilization techniques throughout the first 6-8 weeks in order to avoid adhesions and restricted ROM.
- Full return to play according to surgeon advice only.

Weeks 0-2 Goals:

- Hip Range of Motion (ROM):
 - ✓Ext^t - 0°
 - ✓Flex - 90°
 - ✓Abd^t/Add - 30°
 - ✓IR - 10° - performed with the hip and knee flexed and the foot flat on the bed
 - ✓ER - 45°
- Place an emphasis on gentle rotational motion throughout the permitted ROM
- Active knee mobilization, resistance free
- Bicycle training (high seat, no resistance)
- Soft tissue mobilization, especially scars following suture removal
- Reduction of pain and swelling
- Isometric adductor, abductor and abdominal muscles training

Weeks 3-4 Goals:

- Hip Range of Motion:
 - ✓Ext^t - 0°
 - ✓Flex - 100°
 - ✓Abd^t/Add - 45°
 - ✓IR - 10° - performed with the hip and knee flexed and the foot flat on the bed
 - ✓ER - 60°
- Exercises focused on gluteal muscles strengthening
- Core stability training
- Hydrotherapy pending surgeon approval
- Closed chain basic training according to weigh bearing limitations (e.g. heel rise, weight shifting)

Week 6 and onwards

- Return to full range of motion through capsular stretching. Exercises focused on rotational range as well as hip extension and 'figure of four' stretching.
- Proprioceptive training
- Progressive closed chain training – gradual difficulty level increase while maintaining proper motion pattern (gentle lunges and mini squats)

Week 8 and onwards

- Cardiopulmonary training (cross-trainer, stepper)
- Freestyle swimming allowed
- Plyometric training allowed

Week 12

- Straight line running. Gradual progress through proper running patterns, change of direction and agility drills.

Appendix Figure A1. Time- and goal-based physical therapy protocol provided to each patient upon discharge from hospital. ER, external rotation; IR, internal rotation; ROM, range of motion.