Health-Related Quality of Life After Hip Arthroscopy for Femoroacetabular Impingement: A Systematic Review and Meta-analysis

Chetan Gohal, MD,[†] Saif Shamshoon,[‡] Muzammil Memon, MD,[†] Jeffrey Kay, MD,[†] Nicole Simunovic, MSc,[§] Filippo Randelli, MD,^{||} and Olufemi R. Ayeni, MD, PhD, FRCSC^{*†}

Context: Hip pain from femoroacetabular impingement (FAI) can impair health-related quality of life (HRQL) but can be treated via hip arthroscopy techniques.

Objective: To systematically assess the HRQL outcomes after arthroscopic management of FAI.

Date Sources: Three online databases (EMBASE, PubMed, and Ovid [MEDLINE]) were searched for relevant literature from database inception until June 2018 and screened by 2 reviewers independently and in duplicate.

Study Selection: Level I to IV English studies that investigated HRQL outcomes after hip arthroscopy were included. Data for generic and hip-specific HRQL outcomes were collected. Mean differences were plotted in a forest plot when possible.

Study Design: Systematic review.

Level of Evidence: Level 4.

Results: A total of 29 studies were included for assessment. Of the 6476 patients (6959 hips), the mean age was 32 years (range 9-79 years) and 50.7% were female. Significant improvements were reported in all studies assessing generic HRQL outcomes, including the 12-Item Short Form Health Survey (range of mean postoperative scores, 82.2-89.8), and EuroQOL-5D scores (range of mean postoperative scores, 0.74-0.87) between 12 and 24 months postoperatively. Significant improvements were similarly identified in the hip-specific HRQL outcomes scores, with the majority of studies also reporting improvement between 12 and 24 months postoperatively. Mean improvement in International Hip Outcome Tool-33 scores from preoperative values to postoperative values ranged from 22.7 to 43.2 ($I^2 = 44\%$), for studies with follow-up between 12 and 24 months.

Conclusion: Hip arthroscopy can lead to significant improvement in generic and hip-specific HRQL outcomes at 12 to 24 months postoperatively in patients with FAI who do not have advanced hip osteoarthritis. Confirmatory, high-quality, prospective studies are warranted to compare this observed improvement with other treatment modalities for FAI and to determine long-term outcomes.

Keywords: FAI; femoroacetabular impingement; hip; quality of life; arthroscopy

From [†]Division of Orthopaedic Surgery, Department of Surgery, McMaster University, Hamilton, Ontario, Canada, [‡]Michael G. DeGroote School of Medicine, McMaster University, Hamilton, Ontario, Canada, [§]Department of Methods, Evidence and Impact, McMaster University, Hamilton, Ontario, Canada, and ^{||}Dipartimento di Ortopedia e Traumatologia V, Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS) Policlinico San Donato, Milan, Italy

*Address correspondence to Olufemi R. Ayeni, MD, PhD, FRCSC, McMaster University Medical Centre, 1200 Main Street West, 4E15, Hamilton, Ontario, L8N 3Z5, Canada (email: ayenif@mcmaster.ca).

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The term femoroacetabular impingement (FAI) was popularized by Ganz et al¹⁶ to describe malformation of the femoral head-neck junction and acetabular rim and its effects on chondral and labral injury. Painful hip impingement has long been described by Smith-Petersen⁵⁴ but only recently has it become more thoroughly understood.^{10,54} Hip pain resulting from labral damage and cartilage wear in FAI may progress to hip osteoarthritis (OA) as the joint degenerates further.¹⁶ Hip OA has become a major global public health problem with significant psychological, physical, societal, and economic impacts.²¹ There is evidence to suggest that resolving bony impingement can prevent further labral and chondral damage, possibly delaying the progression of hip OA.¹⁰ Improvement of pain and function has even been shown at short-term follow-up for patients with milder degrees of radiographic degenerative changes preoperatively.³³ Given the major burden of hip OA and associated poor hip health on function and health-related quality of life (HRQL),²¹ it is imperative to understand the impact that early interventions can have on both preventing its progression and improving patient-reported HRQL.

Hip arthroscopy is an established surgical intervention for many hip pathologies, and the acetabular labral tear has become the most common pathology for which hip arthroscopy is indicated.^{5,25,35,51} Patients with FAI can be successfully treated by addressing the underlying pathomorphology, which is accomplished with hip arthroscopy, osteochondroplasty, and acetabular rim decompression.

There are numerous outcome scales through which patients may subjectively report their hip health before and after hip arthroscopy. A number of these outcome scales, such as the modified Harris Hip Score, have historically focused on outcomes for elderly patients with hip OA and have demonstrated a ceiling effect for younger, active populations.²³ Given that the typical population affected by FAI is the young adult, accurate assessment of patient-important outcomes has been difficult. Fortunately, newer validated tools have now been developed, including the International Hip Outcome Tool-33 (iHOT-33) and Copenhagen Hip and Groin Outcome Score (HAGOS), which allow reliable and valid assessment of young active patients with hip conditions.²² This made it possible to examine the impact of interventions such as hip arthroscopy on FAI patient HRQL.

Measuring HRQL is important, as it is an independent expression of a patient's health that encompasses the physical, mental, and social aspects of illness. The evaluation of HRQL in relation to orthopaedic interventions is being used more often.³⁹ The aim of this systematic review was to characterize the impact of hip arthroscopy on HRQL for patients with FAI and to determine factors that may influence its effectiveness.

METHODS

Search Strategy

Three online databases (EMBASE, PubMed, and Ovid [MEDLINE]) were searched for literature from database inception

until June 10, 2018, investigating HRQL outcomes after arthroscopic treatment of FAI. The search included the terms “hip,” “arthroscopy,” “quality of life,” “SF-36,” “SF-12,” “iHOT-33,” “EQ-5D,” “HOOS,” “HAGOS,” and “Oxford.” The outcome scores included above are common generic and hip-specific outcome measures that have been validated.

Study Screening

The titles, abstracts, and full-text articles were screened by 2 reviewers independently and in duplicate in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Disagreements during title and abstract screening moved onto the next stage for more in-depth review. The references of the included studies were subsequently manually screened for additional articles that may have eluded the initial search strategy.

Assessment of Study Eligibility

The research question and study eligibility criteria were established a priori. The inclusion criteria were English-language studies, studies investigating humans, studies with level of evidence 1 to 4, and those investigating HRQL outcomes after arthroscopic treatment of FAI, including labral repair with or without osteochondroplasty. Exclusion criteria were animal studies, commentaries, book chapters, review articles, studies including revision surgery or labral reconstruction, and technical studies.

Data Abstraction

Data were collected by 2 reviewers and recorded in a Microsoft Excel spreadsheet (version 2007, Microsoft). Abstracted data included the authors, year of publication, study design, sample sizes, sex ratio, and mean age. Data were also collected for various HRQL outcome scores pre- and postoperatively, time to improvement in these scores, and various intraoperative and patient-related factors that influenced these scores (labral fixation techniques, joint space narrowing, femoral anteversion, presence of low back pain).

Quality Assessment

The methodological quality of the included studies was assessed using the Method Index for Non-Randomized Studies (MINORS) instrument. This tool was designed to assess the methodological quality of comparative and noncomparative, nonrandomized surgical studies.⁵³ Using the MINORS checklist, noncomparative studies are assigned a maximum score of 16, and comparative studies can achieve a maximum score of 24. The Cochrane Risk of Bias (ROB) tool was used to assess the methodological quality of the included randomized controlled trial (RCT). The Cochrane ROB method evaluates studies for 7 factors related to the quality of evidence, including sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reports, and other issues.¹⁹

Assessment of Agreement

To assess interreviewer agreement, a kappa (κ) statistic was calculated for the title, abstract, and full-text screening stages. An intraclass correlation coefficient (ICC) was calculated for the quality assessment using the MINORS criteria. Agreement was categorized a priori as follows: κ /ICC of 0.61 or greater was considered substantial agreement; κ /ICC of 0.21 to 0.60, moderate agreement; and κ /ICC of 0.20 or less indicating slight agreement.²⁶

Statistical Analysis

Descriptive statistics, including means, proportions, SDs, and 95% CIs were calculated using Minitab statistical software (version 17, Minitab Inc). Given the nonuniform nature of reporting for several of the HRQL outcome measures in the studies included in this systematic review, the results are presented in a narrative summary fashion. A forest plot was conducted evaluating the difference between preoperative and 12 to 24 months postoperative iHOT-33 scores when possible. Meta-analysis of the HRQL outcomes scores could not be performed due to heterogeneous study groups and interventions. Forest plots were created using the Review Manager software (RevMan) 5.3 (The Nordic Cochrane Centre, The Cochrane Collaboration, 2012). The I^2 test was used to assess the heterogeneity across the reported results of the included studies.

Quality of Life Outcome Measures

To deduce whether there were significant improvements in HRQL post hip arthroscopy for FAI, assessment of 6 HRQL measures was undertaken. These included the 12-Item Short Form Health Survey (SF-12), iHOT-33, EuroQOL-5D (EQ-5D), Hip Disability and Osteoarthritis Outcome Score (HOOS), HRQL subscore, HAGOS HRQL subscore, and the Oxford score, which were determined to be the most commonly used validated generic and hip-specific HRQL measures.¹ Follow-up time for these scores was divided into short (12-24 months), moderate (24 months to 5 years), and long term (>5 years). The SF-12 is a survey that uses 12 questions to measure functional health and well-being from a patient point of view. It is a subset of the original 36-Item Short Form Health Survey. It assesses mental and physical health independently but can also be combined to provide a composite score.³⁰ The iHOT-33 is a 33-item self-administered outcome measure used to measure HRQL in young, active patients with hip disorders.³⁷ The EQ-5D is a standardized tool to measure HRQL, which can be used with a wide range of health conditions and treatments. It is composed of facets such as mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, and it also includes an EQ visual analogue scale (VAS), which records patient self-rated health on a vertical VAS.⁹ The HOOS is a questionnaire used to assess patient-relevant outcomes in 5 subscales (pain, symptoms, activities of daily living, sport and recreation function, and hip-related quality of life).⁴² Of interest in this review was specifically the quality of life subscore. The HAGOS consists of 6 separate subscales assessing pain, symptoms,

physical function in daily living, physical function in sport and recreation, participation in physical activity and hip-/groin-related quality of life.⁵⁶ Of interest in this review was the quality of life subscore. The Oxford hip score is a 12-item questionnaire developed to assess function and pain in patients undergoing hip surgery. It is scored out of a maximum 48 points.⁵⁷ This score was originally intended to assess those having had total hip replacement but was recently validated for outcomes postarthroscopy for FAI.²²

RESULTS

Search Strategy

The initial search of the online databases resulted in 7727 total studies. A systematic screening and assessment of eligibility identified 31 full-text articles that satisfied the inclusion and exclusion criteria (Figure 1). However, 2 studies were excluded, as they used the same patient population as another included study (largest and most recent study was kept), resulting in a final total of 29 studies. The reviewers reached substantial agreement at the title ($\kappa = 0.791$; 95% CI, 0.768-0.814), abstract ($\kappa = 0.863$; 95% CI, 0.801-0.925), and full-text ($\kappa = 1.00$) screening stages.

Study Quality

Of the included studies, there were 24 case series (level 4),^{3,8,10,12,15,23,24,26,28,29,31,32,36,38,40,43-49,50,52} 3 case-control studies (level 3),^{4,41,55} 1 retrospective comparative study (level 3),⁹ and 1 RCT (level 1).³⁴ The median MINORS score for the noncomparative studies in this review was 7 (range, 5-9). The median MINORS score for the comparative studies in this review was 12 (range, 10-19). Overall, all studies had a clearly stated aim, 82.1% had appropriate endpoints, 67.9% had an appropriate follow-up period, and 75% had loss of follow-up less than 5%. However, only 10.7% of studies had prospective collection of data and no studies had unbiased assessment of study endpoints. There was substantial inter-rater agreement for the MINORS score with an ICC of 0.826 (95% CI, 0.793-0.859). The overall ROB quality of evidence for the included RCT was found to be moderate. The study posed a high risk of bias with regard to blinding of participants and personnel, and a low risk of bias with regard to random sequence generation, allocation concealment, blinding of outcome assessment, incomplete outcome data, and selective reporting. A summary figure for the risk of bias of the included RCT is provided in Table 1.

Study Characteristics

A total of 6476 patients (6959 hips) were included across the 29 studies. On average, 50.67% of participants were female. Mean age was 31.9 years with a range of 9 to 79 years. Despite the large age range, mean age was between 20 and 40 years for all studies except 2. Follow-up time ranged from 6 months to 10 years with the majority of studies (14) showing significant improvement at 12 to 24 months postoperatively. The HRQL outcome measures used in each study are reported in Appendix

Figure 1. Flow diagram demonstrating the systematic screening of the literature for health-related quality of life outcomes after hip arthroscopy for femoroacetabular impingement.

Table 1 (available in the online version of the article) along with other study characteristics.

HRQL Measures

iHOT-33

Of the 13 studies (2066 patients; 2178 hips) that reported the iHOT-33 as an outcome measure, 12 showed significant improvement postoperatively after hip arthroscopy

($P < 0.05$).^{3,8,9,12,23,24,34,40,41,43,50,55} One study reported improvements in iHOT-33 scores, but P values were not calculated.⁴³ Ten studies found significant improvement between 12 and 24 months postoperatively, and 1 study between 25 months to 5 years. One study found an improvement as early as 3 months postoperatively.¹¹ One study did not report the time to significant improvement.⁴³ In 6 ($n = 788$ hips) of the 11 studies that showed significant improvement, data for preoperative and postoperative

Table 1. The risk of bias in randomized studies of interventions

	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants and Personnel (Performance Bias)	Blinding of Outcome Assessment (Detection Bias)	Blinding of Data Analyst	Incomplete Outcome Data (Attrition Bias)	Selective Reporting (Reporting Bias)	Other Bias
Mansell et al (2018) ³²

Figure 2. Mean differences in iHOT-33 scores for studies reporting preoperative and postoperative values. Nawabi et al. 2016 A and Nawabi et al. 2016 B refer to cohorts within the same study.

scores were available. All 6 studies showed significant improvement between 12 and 24 months postoperatively.^{34,40,41,43,50,55} Mean improvement in iHOT-33 scores from preoperative values to 12- to 24-month postoperative values ranged from 22.7 to 43.2 ($P^2 = 44\%$) (Figure 2). The remaining studies had some heterogeneity in the comparison groups. For instance, Fabricant et al¹² found a smaller but still clinically significant magnitude of improvement in HRQL (median follow-up time 21 months) in the cohort that had less than 5° of femoral anteversion in comparison with the cohort with normal (5°-20°) femoral anteversion (absolute mean improvement of 19 vs 35). Becker et al³ primarily assessed cohorts with preoperative lower back pain (LBP) versus no LBP and found that although all patients who underwent hip arthroscopy for symptomatic FAI improved iHOT-33 scores significantly ($P < 0.001$), those with preoperative LBP self-reported poorer function before and up to 12 months postoperatively.

SF-12

Of the 9 studies (1949 patients; 1995 hips) that reported the SF-12 to assess HRQL, 3 reported significant improvements in all tested cohorts postarthroscopic hip surgery compared with preoperatively.^{10,28,36} Three studies found significant improvement only in specific cohorts or in 1 subset of the SF-12 score.^{15,27,29} The remaining 3 studies did not report significance values for postoperative SF-12 score improvement.^{4,49,52} Of the 3 studies

that found significant improvement in all cohorts, 1 was at follow-up between 12 and 24 months postoperatively,¹⁰ 1 between 25 months and 5 years,²⁸ and the last at greater than 5 years.³⁶ Larson et al²⁸ showed significant improvement in 2 cohorts with FAI, with significantly better scores in the labral refixation group compared with labral debridement/excision. The refixation group demonstrated improvement from 58.7 preoperatively to 89.8 postoperatively and the debridement group had similar changes from 63.8 to 82.2 at mean 3.5 years of follow-up ($P < 0.01$).²⁸ Both groups had FAI correction in addition to labral management. There was significant improvement in 2 cohorts (labral repair vs labral debridement) at 10-year follow-up, with the repair group demonstrating a change of 15 in SF-12 score, and the debridement group showing an improvement of 13 ($P < 0.001$).³⁶ There was no significant difference in outcome scores between the 2 treatment groups.³⁶ Finally, Clement et al⁷ demonstrated preoperative SF-12 (6D) scores of 0.66 with an improvement to 0.82 at 12 months postoperatively in their study ($P < 0.001$). The remaining 6 studies examined various factors that influence postoperative HRQL.^{4,15,27,29,49,52} A single study assessed SF-12 scores in those with postoperative α angles $<55^\circ$ versus $>55^\circ$, and did not show significant HRQL differences between groups.⁴ Two studies compared those with FAI and joint space narrowing (JSN) versus those without JSN.^{29,52} Larson et al²⁹ showed improvements in SF-12 scores of 20.9 points in the FAI group without JSN, but

found no improvement in scores at any time point postoperatively for the FAI group with JSN ($P = 0.22$). There was no significant difference in SF-12 scores between patients treated with looped versus pierced suture technique during arthroscopic hip labral repair ($P > 0.5$).⁴⁹ Flores et al¹⁵ showed physical improvement from 35 preoperatively to 47.4 postoperatively ($P < 0.0001$) and mental improvement from 40.5 to 47.4 in their early cohort ($P = 0.051$) (first 30 consecutive career hip scopes by a given surgeon). In their late cohort, there was a significant improvement from 33.1 to 44.9 ($P = 0.0003$) in the physical subcategory and an improvement from 46.0 to 47.2 in the mental subcategory ($P = 0.720$).¹⁵ Additionally, Larson et al²⁷ compared those with primary versus revision arthroscopies and showed improvements in the primary group of 19.7 ($P < 0.01$) and in the revision group of 12.5 ($P > 0.05$). In the remaining study, Skendzel et al⁵² found improvement in SF-12 scores for HRQL postoperatively, but P values were not calculated.

EQ-5D

All 5 studies (2372 patients; 2697 hips) that reported EQ-5D scores found statistically significant improvements between 12 and 24 months after arthroscopic hip surgery in HRQL ($P < 0.05$).^{31,32,45-47} A study by Lund et al³¹ showed significant improvement from preoperative to the 1-year postoperative mark, with a change of score from 0.66 to 0.77 ($P < 0.001$), but not when comparing 1 year postoperative with 2 years postoperative ($P = 0.26$). Maempel et al³² illustrated significant HRQL changes from 0.65 (95% CI, 0.43-0.72) preoperatively to 0.74 (95% CI, 0.65-0.87) postoperatively ($P < 0.001$). Sansone et al,⁴⁵ in all 3 of their included studies, found statistically significant improvements in HRQL ($P < 0.0001$) after hip arthroscopy for FAI. One study⁴⁵ showed improvements from 0.60 to 0.83 in elite athletes, another⁴⁶ illustrated an improvement from 0.62 to 0.77 in patients with mild to moderate OA, and a third⁴⁷ showed a difference from 0.58 to 0.75 after a 2-year follow-up.

HAGOS

All 4 studies (2284 patients; 2608 hips) that assessed the HAGOS HRQL subscore found statistically significant improvements between 12 and 24 months postarthroscopic hip labrum repair ($P < 0.05$).^{31,45-47} Two studies assessed scores at varying time frames for follow-up and found that the significant improvement occurred at 1 year postoperatively only. There were no significant improvements after the 1-year postoperative follow-up.^{31,46} Lund et al³¹ illustrated a HAGOS HRQL subscore change from 30 preoperatively to 54 at 12 months postoperatively ($P < 0.001$). In the 3 studies by Sansone et al,⁴⁵⁻⁴⁷ preoperative values were 31, 34, and 33, compared with postoperative values of 54, 67, and 58, respectively ($P < 0.0001$, $P < 0.0001$, and $P < 0.05$, respectively). Two of these studies followed-up at 12 months^{31,45} and 1 at 24 months postoperatively.⁴⁶

HOOS

There were 2 studies (160 patients; 160 hips) that assessed outcomes using the HOOS score.^{15,24} Both of these studies

showed improved HRQL 12 to 24 months after hip arthroscopy. One study primarily assessed outcomes related to a surgeon's first career 30 consecutive hip arthroscopies (early group) in comparison with their second 30 consecutive arthroscopies (late group).¹⁵ In both these groups, 12-month postoperative HOOS scores were significantly improved ($P < 0.0001$) compared with preoperative. In the early group, postoperative scores reached 56.0 from 22.2 preoperatively; in the late group, scores improved from 26.3 preoperatively to 62.7 postoperatively.¹⁵ The second study assessed HRQL in those with and without severe hip chondropathy. Those with no chondropathy had improved HRQL scores 18 months after hip arthroscopy, while those with severe or mild chondropathy did not ($P = 0.014$).²⁴

Oxford

Two studies (89 patients; 89 hips) assessed outcomes using the Oxford hip score.^{44,48} Both of these studies found significant improvement in scores between 25 months and 5 years postoperatively. Polat et al⁴⁴ found significant differences ($P < 0.05$) in score changes at a median follow-up of 28.2 months postoperatively (increase from 34.8 preoperatively to 44.4 postoperatively). Soriali and Vandenbulcke⁴⁸ primarily assessed arthroscopy with a novel technique based on initial capsulotomy and a minimal traction approach. They also found significant increases in score from 34.0 preoperatively to 50.0 at a median follow-up time of 39.6 months postoperatively ($P < 0.0001$).

Predictor Variables of HRQL in the Arthroscopic Management of FAI

Patient factors. A selection of 5 studies reviewed (908 patients; 967 hips) commented on preoperative patient factors that influenced HRQL after hip arthroscopy for FAI.^{3,12,24,29,40} Patients with radiographic hip JSN (less than 2-mm joint space),²⁹ or mild or severe hip chondropathy²⁴ did not experience significant improvements in HRQL outcome scores postoperatively. Patients with less than 5° of femoral anteversion showed smaller yet significant improvements in HRQL scores compared with patients with 5° to 20° and >20° of femoral anteversion.¹² Similarly, patients with LBP preoperatively improved HRQL scores but poorer function before and after hip arthroscopy compared with patients without LBP.³ There were no significant differences in iHOT-33 scores between patients with borderline dysplastic hips and those without dysplastic hips both before and after hip arthroscopy (preoperative between-group, $P = 0.259$; postoperative between-group, $P = 0.362$).⁴⁰

Intraoperative factors. Six studies (1272 patients; 1295 hips) assessed HRQL in cohorts that had differing intraoperative courses.^{4,15,27,28,36,49} While all had arthroscopic surgery of the hip, some studies specifically assessed various surgical techniques or procedures. The intraoperative factors that did not result in significant HRQL differences between groups include looped versus pierced suture techniques,⁴⁹ postoperative alpha angles of greater than versus less than 55,⁴ and whether the operating surgeon was performing his or her first consecutive 30 cases versus the next 30 cases.¹⁵ On the other hand, mean

Table 2. Assessment of studies using generic HRQL scores and predictor variables explored in reviewed articles

	Studies Using Score	Pre- to Postoperative Significant Increase	Predictor Variables
SF-12	Briggs et al (2018) ⁴	No	Study compared “post-op alpha <55” vs “Post-op alpha >55” and found no significant difference
	Clement et al (2014) ⁷	Yes	None
	Flores et al (2018) ¹³	Yes, for physical component only	Study compared the first career 30 consecutive hip scopes of a sports medicine surgeon (early group) to the second career 30 consecutive hip scopes (late group) and found no significant difference between cohorts
	Larson et al (2014) ²⁵	Yes, in primary cohort	Study compared primary vs revision surgery and found significantly improved scores in the primary surgery cohort
	Larson et al (2012) ²⁶	Yes	Study compared labral debridement vs refixation surgery and found significantly improved scores in the refixation cohort
	Larson et al (2011) ²⁷	Yes, in cohort without JSN	Study compared patients with impingement and JSN vs those without JSN and found significantly improved postoperative outcomes in those without JSN
	Menge et al (2017) ³⁴	Yes	Study compared those undergoing labral debridement vs repair and found significant improvements in both
	Sawyer et al (2015) ⁴⁷	NR	Study compared looped vs pierced vs combined suturing techniques and found no significant differences
	Skendzel et al (2014) ⁵⁰	NR	Study compared those with joint space <2 mm vs >2 mm and found no difference in scores between cohorts
EQ-5D	Lund et al (2017) ²⁹	Yes	Study compared different follow-up time frames and found significant improvements at 1 year and 2 years postoperatively from baseline, but not between the 1- and 2-year period.
	Maempel et al (2018) ³⁰	Yes	None
	Sansone et al (2015) ⁴³	Yes	None
	Sansone et al (2016) ⁴⁴	Yes	None
	Sansone et al (2017) ⁴⁵	Yes	None

EQ-5D, EuroQOL-5D; HRQL, health-related quality of life; JSN, joint space narrowing; NR, not reported; SF-12, 12-Item Short Form Health Survey.

improvement in HRQL (SF-12) scores was significantly higher in patients undergoing primary repair compared with revision surgery (difference in preoperative to postoperative scores of 19.7 vs 12.5 in primary and revision groups; $P < 0.01$).²⁷ The comparison of labral fixation with debridement/excision was more heterogeneous. Larson et al²⁸ found significantly better SF-12 scores in the fixation cohort (improvement in SF-12 of 31.1 in fixation group vs 18.4 in excision group from pre- to postoperatively). However, Menge et al³⁶ found no significant difference in HRQL improvements between labral debridement

and repair ($P = 0.864$). A summary of predictor variables of HRQL found in each study is summarized in Table 2 and Appendix Table 2 (available online).

DISCUSSION

The most important finding in this review is that hip arthroscopy can lead to substantial improvements in generic and hip-specific HRQL outcomes for patients with FAI. The majority of studies (24 out of 29) demonstrated this

improvement at 12 to 24 months postoperatively. These findings support the use of hip arthroscopy as a highly efficient intervention for patients with FAI.

A number of factors can influence HRQL outcomes after hip arthroscopy for FAI. Patients with mild or severe chondropathy²⁴ as well as patients with radiographic hip JSN²⁹ (less than 2 mm joint space remaining) did not experience significant improvements in HRQL outcomes postoperatively. This is in keeping with multiple previous studies that show the presence of hip OA negatively affects pain and functional outcomes after hip arthroscopy and nonarthroplasty open hip surgery.^{2,6,13,18,20} Furthermore, a greater degree of JSN was found to be an independent predictor of poorer outcome scores and higher failure rates.²⁹ The ability of hip arthroscopy to address OA is limited, hence the lessened benefit in patients with FAI who have advanced hip OA. However, in patients with FAI who do not have JSN/OA, resolving bony impingement and labral injury with hip arthroscopy may address the main pathology. This is supported by the significant improvements in HRQL outcomes seen in this patient population.⁸

A number of studies compared labral fixation with labral debridement/excision during hip arthroscopy for FAI and their differences in HRQL outcomes. Both procedures significantly improve HRQL outcomes, although there was some heterogeneity as to whether there are significant differences between them. In the study by Menge et al³⁶ comparing labral repair and labral debridement, when controlling for confounding covariates (age, acetabular microfractures, JSN) there was no difference in hazard rates for total hip arthroplasty between the groups. These findings suggest that both labral treatments are effective in improving HRQL outcomes and that covariates such as age and JSN are more predictive of progression to total hip arthroplasty than the specific labral treatment. Comparisons can be drawn to arthroscopic knee surgery; evidence suggests that repair of meniscal root tears leads to less OA and subsequent total knee arthroplasty than meniscectomy.¹⁴ Given the similarities in the acetabular labrum and knee meniscus in protecting articular cartilage by distributing peak loads and shear forces,¹⁷ theoretically, preserving the labrum through repair when amenable would be preferred.

This review creates the baseline expectation for magnitude of HRQL improvement after hip arthroscopy for FAI, and future modifications to the procedure can be compared to assess their relative impact on HRQL. It also identifies numerous factors that influence HRQL outcomes after hip arthroscopy, which can help in guiding clinicians to correctly select the appropriate patients for the procedure. Additionally, it allows clinicians to educate patients with clear expectations for improvements in HRQL after their surgical management of FAI.

This review has limitations. Several of the included studies examined HRQL outcomes for hip arthroscopy but did not test for statistical significance in HRQL. The majority of included studies are composed of smaller sample sizes and shorter-term follow-up, limiting the power of their conclusions. Furthermore, many studies involve surgeons more familiar with hip

arthroscopy leading to bias and limiting the generalizability of the results. Finally, there was a substantial variation in the study populations included, as well as the outcome measures reported, limiting the ability to pool the data from many of the outcome measures. However, this meta-analysis did pool the available data that were uniformly reported, to allow for stronger conclusions. Most important, the follow-up of these procedures was typically between 12 and 24 months, leaving the durability of these procedures unknown.

CONCLUSION

Hip arthroscopy can lead to significant improvement in generic and hip specific HRQL outcomes at 12 to 24 months postoperatively in patients with FAI who do not have advanced hip OA. Confirmatory, high-quality, prospective studies are warranted to compare the improvement with other treatment modalities for FAI and to determine long-term outcomes.

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