

Effect of Baseline Mental Health on 1-Year Outcomes After Hip Arthroscopy

A Prospective Cohort Study

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Background: Patient factors, including mental health, sex, and smoking, have been found to be more predictive of preoperative hip pain and function than intra-articular findings during hip arthroscopy for femoroacetabular impingement (FAI); however, little is known about how these factors may influence patients' postoperative outcomes.

Hypothesis: We hypothesized that lower patient-reported mental health scores would be significant risk factors for worse patient-reported outcomes (PROs) 1 year after arthroscopic hip surgery for FAI and that baseline intra-articular pathology would fail to demonstrate an association with outcomes 1 year after FAI surgery.

Study Design: Cohort study; Level of evidence, 2.

Methods: A prospective cohort of patients undergoing hip arthroscopy for FAI were electronically enrolled. Baseline and 1-year follow-up PROs were collected, including Hip disability and Osteoarthritis Outcome Score for pain (HOOS-Pain), HOOS-Physical Function Short Form (HOOS-PS), and Veterans RAND 12-Item Health Survey-Mental Component Score (VR-12 MCS). Intra-articular operative findings and treatment were documented at the time of surgery. Proportional odds logistic regression models were built for 1-year outcomes (HOOS-Pain, HOOS-PS, and VR-12 MCS). Risk factors included patient characteristics and intraoperative anatomic and pathologic findings.

Results: Overall, 494 patients underwent hip arthroscopy for FAI, and 385 (78%) were evaluated at 1 year with at least 1 PRO. The median patient age was 33 years, mean body mass index was 25.5 kg/m², and 72% were female. Multivariable analysis demonstrated that better baseline HOOS-Pain, HOOS-PS, and VR-12 MCS were significantly associated with improvement in the 1-year scores for each PRO. Higher VR-12 MCS was significantly associated with better 1-year HOOS-Pain and HOOS-PS, while current and former smokers had worse 1-year outcomes than those who never smoked. In ranking each variable's relative importance, baseline HOOS-Pain and HOOS-PS and baseline VR-12 MCS were identified as the strongest predictors of 1-year HOOS-Pain and HOOS-PS in our multivariable model.

Conclusion: During hip arthroscopy for FAI, patient factors, including baseline hip pain and function, mental health, and smoking, were independently associated with 1-year PROs of hip pain and function, while intra-articular pathology such as the presence of labral tear and its treatment, tear size, tear location, and anchors placed were not independently associated.

Keywords: mental health; patient-reported outcomes; hip arthroscopy; FAI

Femoroacetabular impingement (FAI) is an increasingly recognized and treated clinical entity in the young and middle-aged population.¹² FAI is diagnosed clinically using a triad of symptoms, physical examination, and radiographic findings. FAI stems from mechanical contact between abnormal morphologic hip features. These are generally placed into 2 categories, although many patients

have contributions of both. Cam-type morphology is characterized by asphericity of the femoral head and lack of normal femoral head-neck offset, and pincer type is caused by acetabular overcoverage and retroversion.^{11,33} Abnormal FAI hip morphology can cause a myriad of associated pathology, such as labral tears, chondrolabral injury, and early degenerative changes.^{11,33} FAI and its sequelae have been shown to have a very high radiographic prevalence in the general population: 37% for cam type, 67% for pincer type, and 68% for labral tears in asymptomatic individuals.¹⁰ A portion of patients with this morphology

The Orthopaedic Journal of Sports Medicine, 9(8), 23259671211025526
DOI: 10.1177/23259671211025526
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will become symptomatic, their nonoperative treatment modalities will fail, and they will be indicated for surgery.¹⁹

Hip arthroscopy has become the gold standard surgical treatment for FAI and labral tears, with increasing utilization in recent years and 9% of new orthopaedic staff performing the procedure.⁹ Surgical treatments for FAI and associated pathology include labral repair, debridement, and reconstruction, as well as femoroplasty and acetabuloplasty. These hip arthroscopic procedures have shown promising results from 1 to 5 years postoperatively, with significant improvement in patient-reported outcomes (PROs), high return-to-sport rates, and a low rate of conversion to total hip arthroplasty.^{4,23} With increased utilization of hip arthroscopy to treat FAI, it is important to determine which patient factors contribute to improvements in pain and function. In a prospective study, Nabavi et al²⁴ found that workers' compensation status and increased body mass index (BMI) were associated with worse hip-specific PROs after arthroscopic treatment of FAI. In a systematic review by Sogbein et al,²⁹ younger age, male sex, lower BMI, Tönnis grade 0, and preoperative pain relief from diagnostic intra-articular hip injections predicted positive outcomes.

Patient-specific factors such as mental health can also influence outcomes after surgery. Orthopaedic literature studying rotator cuff repair³⁴ and spine surgery¹ has shown a large influence of mental health on disease-specific PROs, visual analog scales for pain, and patient satisfaction. In the FAI population, Westermann et al³² showed that lower baseline Veterans RAND 12-Item Health Survey–Mental Component Score (VR-12 MCS) and smoking status were associated with worse Hip disability and Osteoarthritis Outcome Score for pain (HOOS-Pain) preoperatively. Stone et al³⁰ found that revision hip arthroscopy and a mental health history of anxiety or depression predicted persistent postoperative pain after hip arthroscopy for FAI. In a meta-analysis, Cheng et al⁶ discovered that baseline psychological impairment is associated with clinically significantly worse outcomes in patients with FAI who undergo hip arthroscopy, but more standardized reporting is needed on this topic. Currently, there is a need for more data about how these patient factors or pathologic intraoperative findings may influence postoperative rehabilitation, recovery, and PROs. The purpose of the present study was to comprehensively evaluate the patient and operative factors

that contribute to postoperative hip pain and dysfunction outcomes in patients with FAI. We hypothesized that lower patient-reported mental health scores and smoking would be significant risk factors for worse PROs 1 year after arthroscopic hip surgery for FAI and that baseline intra-articular pathology (eg, status/presence of damage to the cartilage or labrum) would fail to demonstrate an association with outcomes 1 year after surgery for FAI.

METHODS

Patient Selection and Data Collection

The study was approved by the hospital's institutional review board and was compliant with the Health Insurance Portability and Accountability Act. Patients undergoing hip arthroscopy with 2 staff surgeons (J.R., R.G.) for treatment of FAI between February 2015 and July 2017 were prospectively enrolled in a longitudinal cohort. Indications for surgery were the presence of a labral tear on magnetic resonance imaging with corresponding cam and/or pincer morphology on radiograph in patients in whom nonoperative treatment had failed (ie, physical therapy, activity modification, and intra-articular injections). These patients underwent labral treatment based on evaluation during arthroscopy, and each had an acetabuloplasty and femoroplasty to address bony FAI pathology. Contraindications for hip arthroscopy were arthritic changes based on magnetic resonance imaging and radiograph and patients with protrusio acetabuli where distraction of the joint would be difficult. Patients who had dysplasia, infection, or isolated psoas release or who were undergoing isolated gluteus medius repair were excluded from the study.

On the day of surgery, patients completed the HOOS-Pain, the HOOS–Physical Function Short Form (HOOS-PS), and the VR-12 MCS and Physical Component Score (PCS) as baseline measures. The same PROs were collected from patients 1 year after surgery. Demographic information and major risk factors were recorded: sex, age, BMI, smoking status, and years of education. Data were electronically collected via tablet by the OME system (OrthoMiDaS Episode of Care) and stored in a Research Electronic Data Capture database (REDCap) managed by the hospital's Musculoskeletal Outcomes Research Center.⁷ On the day

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Final revision submitted February 8, 2021; accepted February 28, 2021.

One or more of the authors has declared the following potential conflict of interest or source of funding: Research reported in this publication was supported by the National Institute of Arthritis and Musculoskeletal and Skin Diseases of the National Institutes of Health under award K23AR066133, which supported a portion of M.H.J.'s professional effort. T.S.L. has received consulting fees from KCI UST and Smith & Nephew, speaking fees from Linvatec, nonconsulting fees from Arthrex and Smith & Nephew, and education payments from Arthrex and Gotham Surgical. R.G. has received consulting fees from OrthoPediatrics, Pacira Pharmaceuticals, and Stryker; honoraria from K2 M; education payments from OrthoPediatrics; and hospitality payments from Zimmer Biomet. K.P.S. has received consulting fees from Flexion Therapeutics. J.R. has received nonconsulting fees from Smith & Nephew. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Ethical approval for this study was obtained from Cleveland Clinic (No. 06-196).

of surgery, a mean data collection time of 6 minutes per patient was observed, and complete preoperative data were collected on 94% of patients undergoing hip arthroscopy during the study period.

Patient-Reported Outcomes

The validated PRO used to evaluate baseline hip pain was the HOOS-Pain.¹⁶ This is a 0- to 100-point subscale, where 100 represents the absence of hip pain and a lower number represents worse hip pain. The HOOS-PS⁸ was used to assess hip function; it is reported on a 0- to 100-point scale, where 0 represents perfect hip function and higher scores represent worse hip function. The VR-12 is a nonproprietary variant of the 12-Item Short Form Health Survey (SF-12) questionnaire meant to assess health-related quality of life.²⁷ The VR-12 includes 12 questions that do not give an overall score but yield PCS and MCS values, which are standardized to the United States population with a mean of 50 and an SD of 10. The VR-12 has been used in the orthopaedics and hip arthroscopy literature.^{5,20,21,28}

Surgeon Data Collection

With enrollment of patients into the prospective cohort, the OME system generated an automatic email for each case and sent it to the 2 participating staff surgeons; this contained a link that allowed for mobile data entry immediately after each hip arthroscopy case. These data collection forms employed branching logic to efficiently capture operative variables believed to be important predictors of outcome: BMI, history of surgery, hip range of motion, the status of the labrum and articular cartilage, the presence and characteristics of cam and/or pincer deformities, and treatments during arthroscopy. The mean data collection time for surgeons was <2 minutes per case. Data for each surgical case were stored in the same REDCap database and were linked with the patient-reported data.

Variables and Statistical Methods

Baseline patient and surgical characteristics were summarized as medians (25th and 75th percentiles) for numeric variables and counts (percentages) for categorical variables. Multivariable proportional odds logistic regression models were constructed with baseline characteristics selected a priori: age at surgery, sex, BMI at surgery, education, smoking status (never, quit, current), arthroscopy Outerbridge cartilage grade (normal, grades 1-4), labral status/treatment (no tear, debridement, repair, other), number of anchors placed, tear size (clockface position), tear location (clockface position; 12 o'clock, superior acetabulum; 3 o'clock, anterior on the right hip; 9 o'clock, anterior on the left hip), prior scope (yes/no), baseline VR-12 MCS, and baseline HOOS-Pain or HOOS-PS for the model. For the tear location variable, the clockface readings from the left and right hips were transformed to be in the same coordinate system so that the results were comparable. The tear location numerically represents the number of hours that the midpoint of the tear is away from 1:30.

Missing data were imputed via multiple imputation by chained equations³ with the predictive mean matching for numeric variables and logistic regression (multinomial for multicategory variables) for categorical variables into 20 data sets. All results were combined using the Rubin formula²⁶ to take into account imputation variability. Wald tests were conducted for each factor to test for overall association with outcomes (ie, a 3 degrees of freedom test was performed for labral status/treatment and a 1 degree of freedom test for everything else). The Bonferroni-Holm multiple-comparison adjustment was used to control the family-wise error rate at 5% across the 3 outcomes.¹³ A $P = .017$ significance level was used to control for multiple comparisons. Odds ratios, 95% CIs, and P values were also reported for each model parameter, and the relative importance of each factor on the outcomes was ranked by the increase in the Akaike information criterion² upon removal from the full model. All analyses were performed with R software (Version 3.5.0).

RESULTS

Patient Demographics and PROs

During the study period, 555 patients underwent arthroscopic hip procedures, with 494 patients undergoing hip arthroscopy for FAI. Of this FAI cohort, 385 (78%) followed up with at least 1 PRO score at 1 year, and their data were used for the remainder of the analysis. Table 1 presents descriptive statistics for patient and surgical characteristics at baseline for all patients and for those with 1 year of follow-up. The median age was 33 years, BMI was 25.5 kg/m², and education level was 14 years. The sample was 72.3% female, and 6.1% had a prior hip arthroscopy. The baseline characteristics of the follow-up cohort were comparable with those of the full cohort and were assumed to be representative (Table 1).

A total of 40 (10.4%) patients in the follow-up cohort had a reoperation within 1 year of the index arthroscopy (20 ipsilateral, 19 contralateral, 1 both). The improvement in median HOOS-Pain and HOOS-PS from baseline to 1 year was 37.5 and 28.9, respectively (Table 2). HOOS-Pain after arthroscopy improved by a minimal clinically important difference¹⁵ (MCID) of 9 for 84.2% of patients. In addition, 12.2% of patients were within the range of the HOOS-Pain MCID and so clinically remained the same, with only 3.6% of patients worsened per the HOOS-Pain MCID of 9.

Multivariable Analysis

Table 3 displays P values for the Wald tests of overall significance in the full models. Smoking status, baseline VR-12 MCS, and baseline HOOS-Pain and HOOS-PS were significantly associated with all 3 outcome measures after multiple-comparison adjustment. Hip arthroscopy cartilage lesions were also significantly associated with HOOS-PS after multiple-comparison adjustment. Age at surgery was associated with HOOS-Pain and HOOS-PS at the nominal .05 significance level but lost significance

TABLE 1
Baseline Demographics, Surgical Characteristics, and PRO Scores
for the Full Preoperative Baseline Cohort and Those With 1-Year Follow-up^a

	Preoperative Cohort (n = 494)		1-y Follow-up Cohort (n = 385)	
	Median (IQR) or No. (%)	No. Missing	Median (IQR) or No. (%)	No. Missing
Age, y	33 (21, 44)	0	33 (22, 44)	0
Sex		0		0
Male	137 (27.73)		97 (25.19)	
Female	357 (72.27)		288 (74.81)	
Body mass index	25.48 (22.64, 29.29)	0	25.39 (22.38, 28.83)	0
Education, y	14 (12, 16)	4	14 (12, 16)	0
Smoking status		90		68
Never	339 (83.91)		274 (86.44)	
Quit	18 (4.46)		12 (3.79)	
Current	47 (11.63)		31 (9.78)	
Outerbridge cartilage lesion grade		0		0
Grades 1 and 2	13 (2.63)		10 (2.6)	
Grades 3 and 4	60 (12.15)		45 (11.69)	
Normal	421 (85.22)		330 (85.71)	
Labral status/treatment		0		0
No tear	32 (6.48)		27 (7.01)	
Debridement	38 (7.69)		29 (7.53)	
Repair	406 (82.19)		318 (82.6)	
Other	18 (3.64)		11 (2.86)	
No. of anchors	3 (3, 4)	88	3 (3, 4)	67
Anchor type		88		67
Q-fix	328 (80.79)		262 (82.39)	
Other	78 (19.21)		56 (17.61)	
Tear size, clockface hours	3 (2, 3)	32	3 (2, 3)	27
Tear location on clockface ^b	0.75 (0, 3)	32	0.5 (0, 3)	27
Prior arthroscopy		0		0
No	464 (93.93)		361 (93.77)	
Yes	30 (6.07)		24 (6.23)	
Baseline PRO scores				
HOOS-Pain	47.5 (37.5, 57.5)	4	47.5 (37.5, 60)	0
HOOS-PS	37.7 (26.9, 50.8)	4	37.7 (26.9, 50.8)	0
VR-12 MCS	55.53 (45.03, 61.58)	4	56.42 (46.64, 61.75)	0

^aHOOS-Pain, Hip disability and Osteoarthritis Outcome Score for pain; HOOS-PS, Hip disability and Osteoarthritis Outcome Score–Physical Function Short Form; IQR, interquartile range; PRO, patient-reported outcome; VR-12 MCS, Veterans RAND 12-Item Health Survey–Mental Component Score.

^bRepresents the number of hours that the midpoint of the tear is away from the 1:30 position.

TABLE 2
Patient-Reported Outcome Scores at 1 Year
and Reoperation Rates (n = 385 Patients)^a

Variable	Median (IQR) or No. (%)	No. of Missing
HOOS-Pain	85 (65, 95)	0
HOOS-PS	8.8 (0, 23.4)	6
VR-12 MCS	56.95 (47.54, 60.69)	2
Hip reoperation		0
None	345 (89.61)	
Ipsilateral	20 (5.19)	
Contralateral	19 (4.94)	
Both	1 (0.26)	

^aHOOS-Pain, Hip disability and Osteoarthritis Outcome Score for pain; HOOS-PS, Hip disability and Osteoarthritis Outcome Score–Physical Function Short Form; IQR, interquartile range; VR-12 MCS, Veterans RAND 12-Item Health Survey–Mental Component Score.

after adjustment. To understand the direction and magnitude of these effects, Table 3 displays odds ratios, 95% CIs, and *P* values for each parameter in the full model for each outcome measure. Smoking (current or former) and worse baseline mental health were associated with worse 1-year HOOS-Pain, HOOS-PS, and VR-12 MCS. Worse baseline pain or function was associated with worse pain and function outcomes at 1 year. The odds ratios for baseline VR-12 MCS were significantly associated with worse 1-year HOOS-Pain, HOOS-PS, and VR-12 MCS but had only minor effects. It is important to note that the odds ratios here are showing how a 1-point change in baseline VR-12 MCS affects the 1-year score. So, a multiple-point difference in baseline VR-12 MCS could be multiplicative on the effects at 1 year. Additionally, patients with normal cartilage during arthroscopy had better function at 1 year than those with grade 1-4 changes.

TABLE 3
Odds Ratios From the Overall Wald Test for the Full Models for Each Outcome Measure^a

	HOOS-Pain		HOOS-PS		VR-12 MCS	
	OR (95% CI)	P Value	OR (95% CI)	P Value	OR (95% CI)	P Value
Age	0.98 (0.97-1)	.03 ^b	1.02 (1-1.04)	.034 ^b	1.01 (0.99-1.03)	.251
Sex						
Male	Reference		Reference		Reference	
Female	0.91 (0.57-1.44)	.69	1.12 (0.7-1.79)	.645	0.94 (0.6-1.49)	.802
Body mass index	0.98 (0.95-1.01)	.2	1.01 (0.98-1.04)	.546	0.98 (0.95-1.01)	.296
Education	1.06 (0.99-1.12)	.083	0.95 (0.9-1.01)	.108	0.97 (0.92-1.04)	.4
Smoking status						
Never	Reference		Reference		Reference	
Quit/current	0.44 (0.24-0.82)	.01 ^c	2.07 (1.13-3.79)	.018 ^c	0.42 (0.22-0.78)	.006 ^c
Outerbridge cartilage lesion grade						
Normal	Reference		Reference		Reference	
Grade 1-4	0.59 (0.34-1.01)	.053	2.01 (1.17-3.46)	.011 ^c	1.28 (0.72-2.28)	.395
Labral tear/treatment						
No tear	Reference		Reference		Reference	
Debridement	2.33 (0.82-6.62)	.112	0.79 (0.28-2.25)	.654	0.78 (0.28-2.15)	.631
Repair	1.16 (0.57-2.39)	.679	1.5 (0.69-3.22)	.303	1.21 (0.57-2.59)	.617
Other	0.6 (0.17-2.05)	.412	4.22 (1.18-15.11)	.027	0.77 (0.22-2.7)	.686
No. of anchors	1.19 (0.86-1.65)	.287	0.87 (0.63-1.2)	.389	0.98 (0.7-1.37)	.913
Tear size	0.91 (0.7-1.19)	.496	1.2 (0.92-1.57)	.188	0.85 (0.67-1.09)	.21
Labral tear location	1.09 (0.96-1.24)	.201	0.98 (0.85-1.12)	.741	0.92 (0.8-1.04)	.178
Prior arthroscopy						
No	Reference		Reference		Reference	
Yes	0.72 (0.33-1.59)	.421	1.1 (0.48-2.52)	.83	1.65 (0.74-3.68)	.217
Baseline						
VR-12 MCS	1.03 (1.02-1.05)	<.001 ^c	0.97 (0.95-0.99)	<.001 ^c	1.09 (1.07-1.11)	<.001 ^c
PRO ^d	1.03 (1.02-1.04)	<.001 ^c	1.03 (1.02-1.04)	<.001 ^c	—	

^aDash indicates no value. HOOS-Pain, Hip disability and Osteoarthritis Outcome Score for pain; HOOS-PS, Hip disability and Osteoarthritis Outcome Score–Physical Function Short Form; OR, odds ratio; VR-12 MCS, Veterans RAND 12-Item Health Survey–Mental Component Score.

^bStatistically significant at the .05 level.

^cStatistically significant after Bonferroni-Holm adjustment.

^dHOOS-Pain or HOOS-PS.

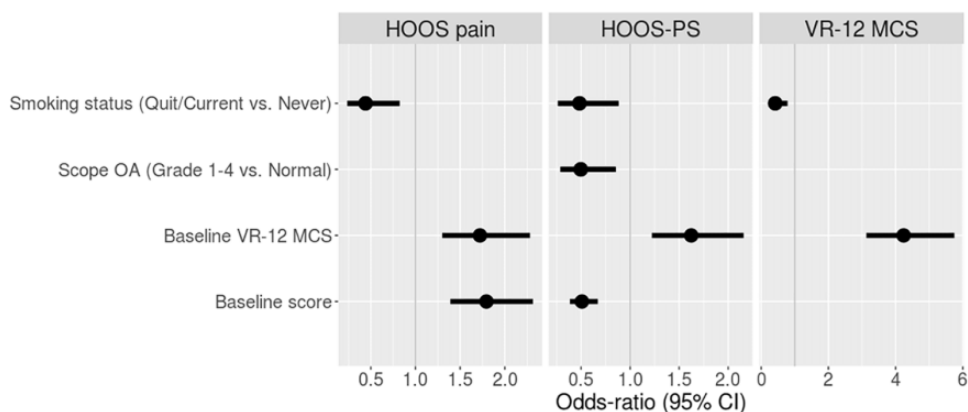


Figure 1. Relative importance of patient and surgical characteristics based on the increase in the Akaike information criterion upon removal from the full model for each outcome. HOOS, Hip disability and Osteoarthritis Outcome Score; MCS, Mental Component Score; OA, osteoarthritis; PS, Physical Function Short Form; VR-12, Veterans RAND 12-Item Health Survey.

Relative Importance

Figure 1 displays the relative importance of each factor as measured by the increase in Akaike information criterion upon its removal from the full model. Baseline PROs explained the most amount of variability in the outcomes. Specifically, baseline HOOS-Pain and HOOS-PS were most associated with their respective 1-year outcomes, while baseline VR-12 MCS also explained a large amount of variability. Smoking status was significantly associated with all 3 outcome scores and arthroscopic cartilage lesion grade was associated with just the HOOS-PS outcome, but they explained only a small amount of variability relative to baseline PROs.

DISCUSSION

This is one of the first prospective cohort analyses of hip arthroscopy for FAI that evaluated the influence of baseline characteristics and intraoperative factors on patient outcomes at 1 year. On average, patients' HOOS-Pain improved 37.5 points postoperatively, and for 84.2% of patients the HOOS-Pain score improved by the MCID of 9. Using multivariable regression, patient factors such as worse baseline pain and function (HOOS-Pain or HOOS-PS), worse baseline mental health (VR-12 MCS), and smoking status are significantly predictive of worse 1-year hip pain, physical function, and general mental health. Interestingly, the patient's intraoperative pathology, including labral treatment, number of anchors used, tear size, tear location, and prior hip arthroscopy, did not predict any outcome measure in our study. Only 1 intraoperative factor, cartilage damage based on the Outerbridge grade, was significantly predictive of worse physical function per the HOOS-PS.

Recent literature has begun to investigate the influence of psychological factors and mental health on outcomes after surgical treatment for FAI. Potter et al²⁵ found that patients with psychological distress based on the Distress Risk Assessment Method questionnaire had lower preoperative Harris Hip Scores and Hip Outcome Scores after multivariable regression modeling. Another study evaluated the effect of diagnosed mental health disorders on preoperative and 2-year postoperative PROs.¹⁷ The matched-cohort study revealed that the multiple hip-specific PROs were lower pre- and postoperatively in patients with history of depression, anxiety, bipolar disorder, posttraumatic stress disorder, or attention-deficit/hyperactivity disorder. In addition, Martin et al²² studied the effect of symptoms of depression, based on SF-12 MCS cutoffs, on the International Hip Outcome Tool and pain visual analog scale scores at 2 years after hip arthroscopy. They indicated that patients with symptoms of depression scored lower on the hip-specific PRO and pain scales postoperatively. Our results are similar in that worse VR-12 MCS at baseline was associated with worse hip-specific and general outcomes at 1 year. Our results are unique in that we were able to use multivariable methodology to evaluate mental health with the VR-12 MCS as a continuous variable

instead of with depression cutoffs or with a diagnosed mental health condition. This allows generalizability to more of the population, as not all patients will have diagnosed conditions or meet depression cutoff scores.

The current study incorporated important intraoperative factors in the multivariable modeling: the status of the labrum and articular cartilage, labral treatment variables, and treatments during arthroscopy. Intuitively, intraoperative pathology should correlate with hip symptoms and pain; however, Jacobs et al¹⁴ found that neither hip pathology nor patient-related factors were significantly correlated with preoperative HOOS in a 64-patient cohort study. They instead stated that a low VR-12 MCS stratum had significantly lower preoperative HOOS. Mirroring these results, Westermann et al³² demonstrated that patient factors such as preoperative mental health, activity level, sex, and smoking are more predictive of baseline preoperative hip pain and function than are intra-articular findings during hip arthroscopy for FAI. Our study is one of the first to extend these results to the postoperative period and show that worse baseline VR-12 MCS and smoking status are significantly predictive of worse 1-year hip pain, physical function, and general mental health. Interestingly, when looking at the relative importance of these factors on follow-up HOOS-Pain, we determined that after the baseline score, baseline VR-12 MCS and smoking status were the next-most important factors at explaining the variability in the follow-up score. Regarding the relative importance of factors on follow-up HOOS-PS after the baseline score, the most important were baseline VR-12 MCS and cartilage damage found during arthroscopy.

Differences in preoperative PRO scores can lead to clinically significant differences in patient outcomes. Consider a hypothetical example: Data are entered into the HOOS-Pain model for 2 patients with the same characteristics except a baseline VR-12 MCS of 38 versus 65; this will lead to a follow-up HOOS-Pain difference of 10 points, which is above the MCID for this scale. Considering the significant improvement in patient outcomes with higher baseline mental health scores, there could be value in preoperative referral to mental health professionals for those with a low VR-12 MCS, which could be a subject to study in the future. It is unknown if baseline mental health scores can be modified in the setting of hip arthroscopy. This could be like prehabilitation performed before anterior cruciate ligament reconstructions. Mental health interventions have shown value in improving outcomes in multiple musculoskeletal pathologies. In a randomized trial of cognitive functional therapy versus manual therapy and exercise in patients with low back pain, the behavioral intervention group showed superior outcomes in pain and disability.³¹ In a systematic review, Louw et al¹⁸ showed that educational strategies targeting neurophysiology and neurobiology positively affect pain, disability, catastrophization, and physical performance in chronic musculoskeletal pain disorders. Alternatively, since chronic pain and osteoarthritis can negatively affect VR-12 MCS, there is a possibility that the lower baseline VR-12 MCS in this study could be related more to worse initial disease than to actual mental health issues. This could

suggest that patients undergo surgery earlier in the disease process, before physical limitations cause lower VR-12 MCS.

This study has some limitations. As this was a cohort study of patients who underwent hip arthroscopy, there is no true control group with which to compare intra-articular pathology and PROs. Just the patients committed to an operation with known intra-articular pathology on history, physical examination, and advanced imaging were surveyed. The study included patients with a minimum 1 year of follow-up, and 78% responded at this time point with PROs. Longer term follow-up (2 years) with a >80% response rate would have been more robust, and patients are currently being evaluated up to that time.

CONCLUSION

Study findings indicated that patient factors are more predictive of 1-year hip pain and function than are intra-articular findings during hip arthroscopy for FAI. Specifically, during hip arthroscopy for FAI, baseline hip pain and function (HOOS-Pain and HOOS-PS), mental health (VR-12 MCS), and smoking were independently associated with 1-year HOOS-Pain and HOOS-PS, while intra-articular pathology such as the presence of labral tear and its treatment, tear size, tear location, and anchors placed, were not. This information can be useful during preoperative education to help manage patients' expectations after their arthroscopic procedure and guide their care.

ACKNOWLEDGMENT

The authors thank the Cleveland Clinic orthopaedic patients, staff, and research personnel, whose efforts related to regulatory requirements, data collection, patient follow-up, data quality control, analyses, and manuscript preparation made this consortium successful. They also thank Brittany Stojasavljevic, editorial assistant, Cleveland Clinic Foundation, for editorial management.

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