

Psychologic Distress Reduces Preoperative Self-assessment Scores in Femoroacetabular Impingement Patients

Michael Q. Potter MD, James D. Wylie MD,
Grant S. Sun BS, James T. Beckmann MD,
Stephen K. Aoki MD

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Abstract

Background In several areas of orthopaedics, including spine and upper extremity surgery, patients with greater levels of psychologic distress report worse self-assessments of pain and function than patients who are not distressed. This effect can lead to lower than expected baseline scores on common patient-reported outcome scales, even those not traditionally considered to have a psychologic component.

Questions/purposes The purposes of this study were to determine (1) the association of psychologic distress and baseline modified Harris hip scores and Hip Outcome Scores in patients undergoing hip arthroscopy; and (2) whether psychologic distress would remain a significant negative predictor of baseline hip scores when other clinical variables such as age, sex, BMI, smoking status, and

American Society of Anesthesiologists (ASA) classification were controlled.

Methods One hundred forty-seven patients at one center were prospectively enrolled when they scheduled hip arthroscopy to treat painful femoroacetabular impingement. Before surgery, psychologic distress was quantified using the Distress Risk Assessment Method questionnaire. Patients also completed baseline self-assessments of hip pain and function including the modified Harris hip score and the Hip Outcome Score. Age, sex, BMI, smoking status, and ASA classification were recorded for each patient. Bivariate correlations and multivariate regression models were used to assess the effect of psychologic distress on patient self-assessment of hip pain and function.

Results Patients with distress reported significantly lower baseline modified Harris hip scores (58 versus 67, $p = 0.001$), Hip Outcome Score-Activities of Daily Living scores (62 versus 72, $p = 0.002$), and Hip Outcome Score-Sports scores (36 versus 47, $p = 0.02$). Distress remained significantly associated with lower baseline modified Harris hip ($p = 0.006$), Hip Outcome Score-Activities of Daily Living ($p = 0.005$), and Hip Outcome Score-Sports scores ($p = 0.017$) when age, sex, BMI, smoking status, and ASA classification were controlled for in the multivariate model.

Conclusions Practitioners should recognize that psychologic distress has a negative correlation with baseline patient self-assessment using the modified Harris hip score and the Hip Outcome Scores, scales not previously described to correlate with psychologic distress. Longitudinal followup is warranted to clarify the relationship between distress and self-perceived disability and the effect of distress on post-operative outcomes in patients having hip arthroscopy.

Level of Evidence Level III, prognostic study. See the Instructions for Authors for a complete description of levels of evidence.

Each author certifies that he or she, or a member of his or her immediate family, has no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research* editors and board members are on file with the publication and can be viewed on request. Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

M. Q. Potter, J. D. Wylie, J. T. Beckmann, S. K. Aoki (✉)
Department of Orthopaedics, University of Utah, 590 Wakara
Way, Salt Lake City, UT 84108, USA
e-mail: stephen.aoki@hsc.utah.edu

G. S. Sun
University of Utah School of Medicine, Salt Lake City,
UT, USA

Introduction

Musculoskeletal disorders are a common cause of pain and disability. Psychosocial factors play an important role in mediating between objective pathophysiology and patients' subjective experience of pain and disability [30]. Higher levels of psychological distress predict greater self-perceived pain, decreased self-perceived function, and a poor response to therapeutic interventions in patients with low back pain [4, 8], surgical spine conditions [2, 28, 29], hip and knee arthritis [9, 11], chronic shoulder pain [23], and orthopaedic hand and elbow conditions [12, 30, 31].

Patients who undergo hip arthroscopy for treatment of femoroacetabular impingement (FAI) are commonly assessed preoperatively with hip-specific measures of pain and function, including the modified Harris hip score [1, 27] and the Hip Outcome Score [13, 15, 27]. Lower preoperative scores on the modified Harris hip score correlate with lower postoperative scores after surgical treatment of FAI [20, 25], although a similar effect has not been described for the Hip Outcome Score. In the upper extremity, scores on common orthopaedic outcome scales have been shown to depend heavily on psychosocial variables [12, 21, 22, 24, 30] in addition to medical comorbidities [26, 32]. To our knowledge, there has been no similar investigation regarding what influence psychosocial variables may have in determining baseline modified Harris hip score and Hip Outcome Score.

The purposes of this study were to determine (1) the association of psychological distress and baseline modified Harris hip scores and Hip Outcome Scores in patients undergoing hip arthroscopy; and (2) whether psychological distress would remain a significant negative predictor of baseline hip scores when other clinical variables such as age, sex, BMI, smoking status, and American Society of Anesthesiologists (ASA) classification were controlled.

Patients and Methods

Study Design

This was a prospective cohort study of patients undergoing hip arthroscopy for hip pain secondary to FAI. Approval was obtained from our institutional review board before beginning patient enrollment. Inclusion criteria identified patients who were 18 years or older and who scheduled a hip arthroscopy for a primary symptom of hip pain secondary to FAI. Indications for surgery included patients with groin or buttocks pain with or without mechanical symptoms, reproduction of pain with flexion, adduction, and internal rotation on examination, and imaging findings

consistent with FAI. In addition, patients were included if they had at least 3 months of failed nonoperative treatment, including antiinflammatory medications, physical therapy, and corticosteroid injection. Exclusion criterion included an inability to complete all three questionnaires (Distress Risk Assessment Method, modified Harris hip score, and Hip Outcome Score). One hundred seventy-three patients were approached to participate. Two patients (1%) declined to participate and 24 patients (14%) did not complete all three questionnaires, leaving 147 patients (86%) who were included in the analysis. Age at the time of surgery, sex, BMI, smoking status, and ASA classification were recorded for all enrolled patients. There were no significant differences in age, sex, BMI, smoking status, and ASA classification between patients who did and did not complete all three questionnaires.

Patients filled out paper questionnaires which then were collected, scored, and entered in a database by a study coordinator (DP) who was not involved in patient care. Patients were classified in "normal" and "distressed" groups based on their responses to the Distress Risk Assessment Method questionnaire. Patients categorized as "at-risk", "distressed-depressive", or "distressed-somatic" were considered to be "distressed" and were treated as a single group that was compared with "normal" patients in the statistical analysis. All patients subsequently underwent hip arthroscopy performed by the principal investigator (SKA) between January 2012 and July 2013. The treating physician and all others involved in patient care remained blinded to enrolled patients' Distress Risk Assessment Method classifications during treatment and clinical followup. Data entry and statistical analyses were performed by several of the authors (MQP, JDW, GSS) who were not involved in the clinical care of the enrolled patients.

Patient Demographics

Seventy-one patients (48%) were classified as normal and 76 patients (52%) were classified as distressed. Their average age was 34 years (range, 18–67 years) in the normal group and 37 years (range, 18–62 years) in the distressed group ($p = 0.10$). The normal group contained 62% female patients versus 63% female patients in the distressed group ($p = 0.85$). The normal group contained 23% active smokers versus 24% active smokers in the distressed group ($p = 0.87$). The average ASA classification was 1.4 (range, 1–3) in the normal group and 1.5 (range, 1–3) in the distressed group ($p = 0.14$). The average BMI was 25 kg/m² (range, 18–55 kg/m²) in the normal group and 27 kg/m² (range, 17–49 kg/m²) in the distressed group ($p = 0.09$; Table 1).

Table 1. Demographic characteristics by Distress Risk Assessment Method group

Demographic characteristic	Normal (n = 71)	Distressed (n = 76)	p value
Age (years)	34 ± 1 (95% CI, 31–36)	37 ± 1 (95% CI, 34–40)	0.10
Sex	45 females/26 males	47 females/29 males	0.85
BMI (kg/m ²)	26 ± 1 (95% CI, 24–27)	27 ± 1 (95% CI, 26–28)	0.09
Smoking status	16/71 (23%)	18/76 (24%)	0.87
ASA classification	Class I 45 (63%) Class II 25 (36%) Class III 1 (1%)	Class I 38 (50%) Class II 36 (47%) Class III 2 (3%)	0.14

ASA = American Society of Anesthesiologists; age and BMI are reported as mean ± standard error of the mean with 95% CIs.

Surgical Treatment

All patients underwent hip arthroscopy by one surgeon (SKA) at an orthopaedic-specialty ambulatory surgery center. Arthroscopy was performed with the patient in the supine position under a general anesthetic. Procedures performed included femoral osteochondroplasty, acetabuloplasty with labral repair, and/or capsular closure at the surgeon's discretion.

Outcome Measures

The Distress Risk Assessment Method is a 45-item patient questionnaire that often is used to quantify psychologic distress in patients presenting for orthopaedic care [4, 6, 18, 28]. It includes the modified Zung Depression Scale and the Modified Somatic Perception Questionnaire, and the scores on these two questionnaires are combined to stratify patients into normal, at-risk, and distressed groups, which represent increasing levels of depressive and somatic symptoms [14]. The Distress Risk Assessment Method has been validated and shown to correlate with worsening psychologic distress as measured by the more comprehensive Minnesota Multiphasic Personality Inventory [7, 14]. As such, it represents a parsimonious method to stratify patients into groups of lesser or greater psychologic distress.

The modified Harris hip score and Hip Outcome Score are commonly used and validated hip outcome scores that rely on patient self-reporting of hip pain and function [1, 13]. The modified Harris hip score contains eight questions assessing pain, function, and activities of daily living. Each question is answered on a Likert scale and the total score ranging from 0 (debilitating symptoms) to 100 (no symptoms) is calculated. The Hip Outcome Score has 28 questions across two domains, one focused on activities of daily living (Hip Outcome Score-Activities of Daily Living) and one focused on sports participation (Hip Outcome Score-Sports). Questions are answered on a Likert

scale and the total score ranging from 0 (poor function) to 100 (normal function) is calculated for each domain [10].

Statistical Analysis

Student's t-tests were used to evaluate the difference in means between normal and distressed groups. Pearson correlation coefficients were calculated to test the correlation between continuous variables. For multivariate modeling, preliminary data analysis targeted applicability of linear assumptions. Age, BMI, and gender were chosen as important risk adjustors in all medical studies. The ASA classification was chosen as a risk adjustor to account for medical comorbidity. Patient smoking status also was selected as a potential predictor of hip scores. Regression was implemented using general linear regression models with continuous and categorical predictors and visual analysis of frequency distributions. Continuous variables (age, BMI, modified Harris hip score, Hip Outcome Score-Activities of Daily Living, Hip Outcome Score-Sports) were entered as their numeric values. Categorical variables were entered as dummy variables (gender: female = 0, male = 1; Distress Risk Assessment Method category: normal = 0, at risk/distressed = 1; smoking status: non-smoker = 0, smoker = 1). ASA classification was entered as a continuous variable from 0 to 4. Final analysis was implemented using ordinary least squares linear regression. All variables were entered in the model and kept as important risk adjustors selected a priori. Regression coefficients for each variable are reported. Probability values less than 0.05 were considered significant. Calculations were done using SPSS 17.0 (SPSS Inc, Chicago, IL, USA).

Results

Patients with increased levels of psychologic distress had significantly lower baseline scores on their modified Harris hip score and Hip Outcome Score questionnaires. The

Table 2. Preoperative hip scores by Distress Risk Assessment Method group

Hip scores	Normal (n = 71)	Distressed (n = 76)	p value
Modified Harris hip score	67 ± 2 (95% CI, 63–70)	58 ± 2 (95% CI, 54–62)	0.001
Hip Outcome Score-Activities of Daily Living	72 ± 2 (95% CI, 68–75)	62 ± 2 (95% CI, 57–66)	0.002
Hip Outcome Score-Sports	47 ± 3 (95% CI, 41–53)	36 ± 3 (95% CI, 30–42)	0.02

Scores are reported as mean ± standard error of the mean with 95% CIs.

Table 3. Bivariate correlations between distress scores and hip outcome scores

Hip scores	Modified Zung Depression Scale	Modified Somatic Perceptions Questionnaire
Modified Harris hip score	R = -0.257 p = 0.002	R = -0.226 p = 0.006
Hip Outcome Score-Activities of Daily Living	R = -0.241 p = 0.04	R = -0.246 p = 0.003
Hip Outcome Score-Sports	R = -0.171 p = 0.05	R = -0.096 p = 0.28

mean preoperative modified Harris hip score in the normal group was 67 ± 2 versus 58 ± 2 in the distressed group (p = 0.001). The mean preoperative Hip Outcome Score-Activities of Daily Living score in the normal group was 72 ± 2 versus 62 ± 2 in the distressed group (p = 0.002). The mean preoperative Hip Outcome Score-Sports score in the normal group was 47 ± 3 versus 36 ± 3 in the distressed group (p = 0.02) (Table 2). The component questionnaires used to determine Distress Risk Assessment Method categories, the modified Zung Depression Scale and Modified Somatic Perceptions Questionnaire, showed weak but statistically significant correlations with preoperative modified Harris hip scores and Hip Outcome Scores. The modified Zung Depression Scale had correlation coefficients of -0.257 with the modified Harris hip score (p = 0.002), -0.241 with the Hip Outcome Score-Activities of Daily Living (p = 0.004), and -0.171 with the Hip Outcome Score-Sports (p = 0.05). The Modified Somatic Perceptions Questionnaire had correlation coefficients of -0.226 with the modified Harris hip score (p = 0.006), -0.246 with the Hip Outcome Score-Activities of Daily Living (p = 0.003), and -0.096 with the Hip Outcome Score-Sports (p = 0.28) (Table 3).

In the regression analysis, greater levels of psychologic distress were correlated with lower baseline modified Harris hip scores and Hip Outcome Scores after accounting for age, sex, BMI, smoking status, and ASA classification. A Distress Risk Assessment Method score outside the normal range correlated significantly with lower modified Harris hip ($\beta = -7.3$, p = 0.006), Hip Outcome Score-Activities of Daily Living ($\beta = -8.8$, p = 0.005), and Hip

Outcome Score-Sports ($\beta = -10.7$, p = 0.017) scores. Active smoking status correlated significantly with lower Hip Outcome Score-Activities of Daily Living ($\beta = -8.5$, p = 0.029) and Hip Outcome Score-Sports ($\beta = -15.1$, p = 0.006) scores but not with modified Harris hip scores ($\beta = -5.7$, p = 0.08). BMI correlated significantly with lower modified Harris hip scores ($\beta = -0.6$, p = 0.024) but not Hip Outcome Score-Activities of Daily Living or Hip Outcome Score-Sports scores. Age, sex, and ASA classification did not correlate significantly with modified Harris hip scores or Hip Outcome Scores (Table 4).

Discussion

Psychosocial factors play an important role in mediating between objective pathophysiology and patients' subjective experience of pain and disability [30]. Scores on commonly used upper-extremity orthopaedic outcome scales have been shown to depend heavily on psychosocial variables [12, 21, 22, 24, 30] and medical comorbidities [26, 32]. We investigated whether psychologic distress has an influence on baseline modified Harris hip scores and Hip Outcome Scores in a patient population undergoing hip arthroscopy to treat painful FAI. We found that (1) greater levels of psychologic distress correlated significantly with lower baseline modified Harris hip scores and Hip Outcome Scores; and (2) greater psychologic distress continued to correlate with lower scores when age, sex, BMI, smoking status, and ASA classification were controlled for.

Our study has several limitations. First, our results are based on questionnaires given to a prospective cohort at one time during the course of their treatment, preventing us from drawing conclusions regarding the direction of the relationship between psychologic distress and patient perceptions of hip pain and disability or the effect of distress on postoperative outcomes. Second, patients were enrolled at the time they scheduled hip arthroscopy, rather than as they presented to clinic, excluding patients treated conservatively without hip arthroscopy and potentially introducing a selection bias. We attempted to minimize this bias by approaching each patient who scheduled arthroscopy for inclusion in the study; ultimately, 86% of those patients are included in the analysis. Third, psychologic distress was

Table 4. Psychologic distress, patient factors, and preoperative hip outcome scores

Hip scores	Distress Risk Assessment Method	Age	Sex	BMI	Smoking status	ASA classification
Modified Harris hip score	$\beta = -7.3$ $p = 0.006$	$\beta = -0.2$ $p = 0.12$	$\beta = 2.2$ $p = 0.44$	$\beta = -0.6$ $p = 0.024$	$\beta = -5.7$ $p = 0.08$	$\beta = -0.5$ $p = 0.87$
Hip Outcome Score-Activities of Daily Living	$\beta = -8.8$ $p = 0.005$	$\beta = -0.2$ $p = 0.23$	$\beta = 2.1$ $p = 0.54$	$\beta = -0.4$ $p = 0.18$	$\beta = -8.5$ $p = 0.029$	$\beta = -1.1$ $p = 0.75$
Hip Outcome Score-Sports	$\beta = -10.7$ $p = 0.017$	$\beta = -0.2$ $p = 0.24$	$\beta = 5.1$ $p = 0.29$	$\beta = -0.3$ $p = 0.49$	$\beta = -15.1$ $p = 0.006$	$\beta = -1.7$ $p = 0.71$

ASA = American Society of Anesthesiologists.

evaluated only with a self-administered questionnaire rather than a structured psychologic interview, which could have led to misclassification of patients in normal or distressed groups. However, structured interviews are impractical in an outpatient orthopaedic clinic, and the Distress Risk Assessment Method questionnaire is a validated [7, 14] and widely used [4, 6, 18, 28] instrument to assess psychologic distress without overly burdening the patient or clinician. Fourth, all patients were enrolled by one surgeon at one tertiary care academic medical center and their inclusion in the study may be subject to selection bias on the part of the treating surgeon. We attempted to minimize this bias by ensuring that patients indicated for hip arthroscopy had history, examination, and imaging findings consistent with FAI, and that at least 3 months of conservative therapy failed before surgery for these patients.

In this study, we found an association between greater levels of psychologic distress and lower baseline scores on the modified Harris hip score and Hip Outcome Score scales in a population undergoing hip arthroscopy to treat painful FAI. The modified Harris hip score and Hip Outcome Score traditionally are thought to assess physical dimensions like hip pain, stiffness, and function, but we suggest they also are influenced by psychologic distress. Our results are in accordance with others from the arthroplasty literature [9, 11], which found a similar association between distress and variance in outcome scores. In one retrospective cohort of 356 patients undergoing total joint arthroplasty at a mean of 2.5 years from surgery, questionnaire-assessed psychologic distress was found to explain 30% of the variation in the Forgotten Joint Score-12 and 58% of the variation in the WOMAC osteoarthritis index scores [9]. In a second cohort of 640 patients undergoing total joint arthroplasty at a mean of 5.5 years from surgery, lower scores on the SF-36 mental health scale were a significant predictor of inferior scores on the WOMAC [11]. Roh et al. [24] reported that the Simple Shoulder Test showed significant correlation with the Pain Anxiety Symptom Scale, and the DASH showed significant

correlation with the Pain Anxiety Symptom Scale and the Center for Epidemiologic Studies-Depression scale, measures of anxiety and depression similar to the Distress Risk Assessment Method questionnaire we used. Taken together, these findings suggest a significant and perhaps underappreciated negative correlation between psychologic distress and baseline scores on commonly used orthopaedic outcomes scales, particularly scales (Simple Shoulder Test, DASH, WOMAC, modified Harris hip score, and Hip Outcome Score) that rely heavily or exclusively on patient self-assessment of pain and function. By contrast, the Constant-Murley scale, which bases 65% of its score on physical examination findings and 35% on patient self-assessment, did not correlate significantly with Pain Anxiety Symptom Scale or Center for Epidemiologic Studies-Depression scores [24].

Regarding our second study question, we found that the correlation between greater psychologic distress and lower baseline modified Harris hip scores and Hip Outcome Scores persisted when age, sex, BMI, smoking status, and ASA classification were controlled for. Studies have shown that a greater number of medical comorbidities correlates with worse baseline patient self-assessment of shoulder function [26, 32]. Although this has not been studied specifically in a hip arthroscopy population, we incorporated patients' ASA classification in our multivariate analysis as a measure of medical comorbidity, identifying no significant correlation. In studies of prognostic factors for success or failure after operative treatment of FAI, the presence of high-grade chondral changes at the index procedure [3, 16, 17, 25], joint space narrowing on radiography [19], older age [5, 16, 17, 25], longer duration of symptoms [20, 25], and lower preoperative modified Harris hip score [20, 25] were identified as patient factors that predict lower postoperative scores. We did not assess postoperative scores in our study, but we did not see a correlation between increasing patient age and lower modified Harris hip scores and Hip Outcome Scores before surgery, unlike the reported correlations seen postoperatively [5, 16, 17, 25].

In their multivariate analysis of baseline shoulder scores on the Simple Shoulder Test and the DASH, Roh et al. [24] found that a best-fit model to explain the majority of variance in scores incorporated patient sex, shoulder ROM, pain, and strength, in addition to their psychologic variables of interest. We considered patient sex in our regression analysis, but unlike Roh et al. [24], we saw no significant correlation between sex and baseline scores on the modified Harris hip score or the Hip Outcome Score.

Although greater psychologic distress independently correlates with lower modified Harris hip scores and Hip Outcome Scores before surgical intervention, the influence of distress on patient outcomes after hip arthroscopy remains uncertain. We suggest clinicians should be aware of a potential psychologic contribution to baseline scores on these commonly used hip outcome scales, and we encourage further investigation of the relationship between distress and patient outcomes after hip arthroscopy. Postoperative assessment of modified Harris hip scores, Hip Outcome Scores, and Distress Risk Assessment Method scores is required to determine whether patients who are normal or distressed report differences in outcome or clinical improvement after surgical treatment. Longitudinal followup also may help clarify whether improvements in hip pain and function after arthroscopy correlate with decreased psychologic distress.

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