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Effect of Sacroiliac Joint Pain on Outcomes in Patients Undergoing Hip Arthroscopy for the Treatment of Femoroacetabular Impingement Syndrome

A Matched Comparative Cohort Analysis at Minimum 2-Year Follow-up

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Background: Patients with femoroacetabular impingement syndrome (FAIS) may frequently have co-existing sacroiliac joint (SIJ) pain. It is known that patients with lower back pain undergoing total hip arthroplasty (THA) have inferior outcomes; however, it is unclear what the effect of SIJ pain is on outcomes after hip arthroscopy.

Purpose: To determine whether patients undergoing hip arthroscopy with SIJ pain either subjectively or on physical examination achieve similar postoperative improvement in patient-reported outcomes (PROs) compared with patients without SIJ pain at 2-year follow-up.

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

Methods: Patients with a minimum 2-year follow-up who underwent primary hip arthroscopy for FAIS with SIJ pain were matched in a 1:2 ratio to controls without SIJ pain. Baseline demographics, as well as postoperative PROs and rates of achievement of the minimal clinically important difference (MCID) or Patient Acceptable Symptom State (PASS) at 2-year follow-up were compared between the 2 groups.

Results: A total of 73 patients (75 hips) with SIJ pain were matched to 150 control patients (150 hips) without SIJ pain. Both groups demonstrated statistically significant improvement in all PROs at 2 years ($P < .05$ for all). Patients with SIJ pain had significantly lower postoperative PRO scores for the Hip Outcome Score–Activities of Daily Living (HOS-ADL) (SIJ pain: 80.4 ± 22.4 vs no SIJ pain: 88.0 ± 15.1; $P = .006$), modified Harris Hip Score (mHHS) (SIJ pain: 73.2 ± 22.8 vs no SIJ pain: 80.0 ± 17.3; $P < .001$), and International Hip Outcome Tool–12 questionnaire (iHOT-12) (SIJ pain: 61.7 ± 25.9 vs no SIJ pain: 73.7 ± 23.7; $P = .008$). There were no statistically significant differences in improvement (delta) in PRO scores between the 2 groups ($P > .05$ for all). The SIJ pain group had significantly lower achievement of MCID for the HOS-ADL (SIJ pain: 65.2% vs no SIJ pain: 80.5%; $P = .044$) but not HOS-SS, mHHS, or iHOT-12 ($P > .05$ for all). The SIJ pain group had significantly lower achievement of PASS for the mHHS (SIJ pain: 27.5% vs no SIJ pain: 45.3%; $P = .030$) and iHOT-12 (SIJ pain: 31.0% vs no SIJ pain: 56.0%; $P = .010$) but not the HOS-ADL and HOS-SS ($P > .05$ for both). Only 4.1% of patients with SIJ pain and 2.4% of controls required revision surgery or converted to THA at the time of final follow-up ($P = .69$).

Conclusion: Patients with FAIS and SIJ pain on history or physical examination experience significant improvement in PROs at 2 years after hip arthroscopy. However, they may be less likely to achieve the MCID or PASS and have significantly lower postoperative PROs compared with a matched cohort of patients without SIJ pain. Overall rates of revision and conversion to THA were similarly low in both groups.

Keywords: hip arthroscopy; hip; femoroacetabular impingement; groin pain; lumbar spine

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Femoroacetabular impingement syndrome (FAIS) is a common cause of hip pain secondary to bony abnormalities on either the femoral side, acetabular side, or both resulting in abnormal contact during range of motion.[9,16] Not only can the pain from FAIS be debilitating, but it can result

in labral tearing and cartilage damage, predisposing patients to early osteoarthritis.[11] In cases where nonoperative management is unsuccessful, hip arthroscopy may be used for the surgical management of FAIS.[9,16] However, preoperative assessment and careful patient selection are key to optimizing outcomes in hip arthroscopy and may include examination of common pain locations.

Patients with FAIS classically present with anterior groin pain; however, patients may also report isolated lateral or posterior hip pain. In some cases, patients may even have multiple primary locations of pain around the hip.[7] It is known that hip and sacroiliac joint (SIJ) disorders often co-exist.[17] Patients with lower back pain are known to have altered hip kinematics and decreased range of motion, which may predispose them to FAIS.[22] These factors may make it difficult for clinicians to determine whether a patient's symptoms are caused primarily by hip pathology, SIJ pain, or both.[26] Several studies have shown that patients treated with total hip arthroplasty (THA) may have inferior results if they have preoperative lower back pain.[21] However, despite this, many patients undergoing THA are known to experience improvement or resolution of their back pain postoperatively.[21]

Although outcomes after hip arthroscopy are generally positive, patient selection is critical in obtaining a good outcome.[13] Risk factors for poor outcomes and/or conversion to THA include patient obesity, presence of osteoarthritis, and having the procedure performed by a low-volume surgeon.[10] However, it remains unclear whether the presence of SIJ pain predisposes patients to a poor outcome after hip arthroscopy.

The purpose of this study was to determine whether patients undergoing hip arthroscopy for FAIS who had SIJ pain either subjectively or on physical examination preoperatively achieve similar postoperative improvement in patient-reported outcomes (PROs) at 2-year follow-up compared with patients without SIJ pain. Secondary objectives were to determine whether patients with SIJ pain undergoing hip arthroscopy had lower rates of achievement of the minimal clinically important difference (MCID) or Patient Acceptable Symptom State (PASS) and whether they had higher rates of revision surgery or conversion to THA. Our hypothesis was that patients with SIJ pain would experience significant clinical improvement compared with preoperatively. However, we also hypothesized they would obtain less improvement compared with patients without SIJ pain.

METHODS

Patient Selection

After we obtained approval from the local institutional review board, patients were retrospectively selected from a prospectively maintained single institutional database. Consecutive patients who underwent primary hip arthroscopy for FAIS and/or labral tear by the senior author (S.J.N.) between January 2012 and May 2018 were eligible for inclusion. Additional inclusion criteria consisted of clinical and radiographic diagnosis of symptomatic FAIS by the senior author (ie, bony impingement identified on preoperative radiographs such as an alpha angle $>57°$) and failure of nonoperative management (physical therapy, activity modification, oral nonsteroidal anti-inflammatory drugs, and/or intra-articular cortisone injections). Cases were required to have SIJ pain either subjectively indicated by the patient or objectively indicated by tenderness to palpation over the SIJ on physical examination (Figure 1). Patients were required to have completed at least 1 PRO at a minimum of 2 years postoperatively to be eligible for inclusion. Patients with a history of pediatric hip diseases (eg, slipped capital femoral epiphysis, Legg-Calve-Perthes disease, or congenital hip dislocation) or those who underwent revision hip arthroscopy were also excluded from the study. Patients were matched in a 1:2 ratio by age (within 2 years), sex, body mass index (BMI) (within 5 kg/m^2), and Tönnis grade to a cohort of control patients who underwent hip arthroscopy without SIJ pain. A minimum of 2-year follow-up was available for 82.7% of all patients during the study period.

Assessment of SIJ Pain

SIJ pain was assessed with a standard history and physical examination. History taking and physical examination were performed by the senior author for all patients. Subjective SIJ pain was indicated in cases where patients identified the primary or secondary location of their pain over the SIJ by pointing to the area over the SIJ in the posterior buttock. Objective SIJ pain was indicated in cases where pain was elicited on palpation of the SIJ or a positive pain provocation test similar to the technique best described by Barros et al.[2] Pain provocation testing included the distraction test and thigh thrust test, followed by the addition of a compression test if appropriate.

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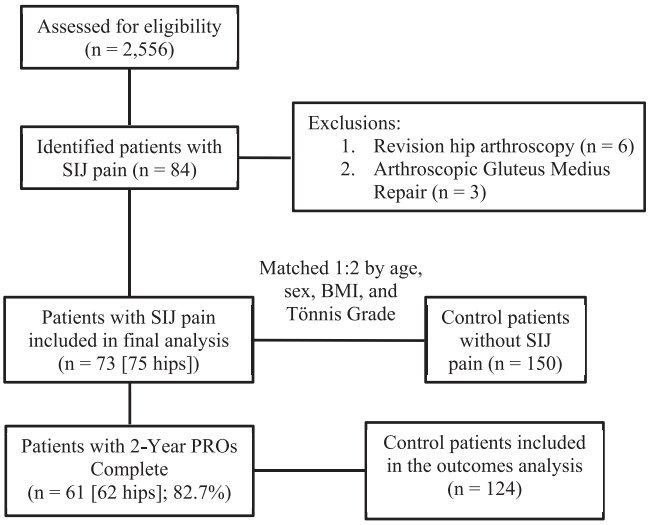

Figure 1. CONSORT (Consolidated Standards of Reporting Trials) flow diagram of patient selection methods. BMI, body mass index; PRO, patient-reported outcome; SIJ, sacroiliac joint.

The distraction test was positive when posterolateral directed pressure to the bilateral anterior superior iliac spine reproduced the patient's pain. The thigh thrust test was positive if an anteroposterior shear force applied to the SIJ through the axis of the femur by applying a vertical force through the femur aimed posteriorly with the hip flexed to 90° reproduced the patient's pain. The compression test was deemed positive when compression of the pelvis with pressure applied over the iliac crest directed at the contralateral iliac crest reproduced the patient's symptoms. SIJ pain was distinguished from low back pain if both the thigh thrust and distraction tests were positive, or if 1 of the 2 were positive followed by a positive compression test.

Data Collection

Patient demographic data including age, sex, and BMI were recorded. Additional history including current or former smoking status, history of low back pain (not including SIJ pain), workers' compensation status, and history of psychiatric comorbidities was recorded. Preoperative radiographic characteristics including alpha angle measured on anteroposterior and Dunn lateral plain radiographs, lateral center-edge angle, and Tönnis angle were measured and compared between groups.

Operative Technique

All patients underwent general endotracheal anesthesia. The operative leg was prepared and draped in standard surgical fashion. Preoperative antibiotics were administered. A standard anterolateral portal was established under fluoroscopic guidance and an anterior portal under direct visualization. An interportal capsulotomy connecting the anterior to anterolateral portal was performed. Limited synovectomy was performed as needed. In cases of pincer impingement, a 5.5-mm bur was used to perform an acetabular rim trimming to remove the bony overgrowth from the acetabulum. In cases where it was determined a microfracture procedure was needed, multiple holes were drilled using a microfracture drill, which provided bleeding from the subchondral plate. Labral repair was performed using a simple stitch technique as needed. Hip traction was released at this point and a T-capsular cut was then performed. A 5.5-mm bur was used to perform a femoral osteochondroplasty to restore the femoral head and neck offset. Dynamic examination and fluoroscopic imaging were used to confirm no further impingement. High-strength sutures were then used to close the iliofemoral ligament as well as the capsulotomy using a 2-portal technique and suture lasso. Last, 3-0 Vicryl sutures were used to close the deep subcutaneous tissues, followed by 2-0 Prolene sutures and a sterile dressing.

Postoperative Outcome Analysis

PRO measures including the Hip Outcome Score–Activities of Daily Living (HOS-ADL) and Sports Subscale (HOS-SS), modified Harris Hip Score (mHHS), and International Hip Outcome Tool–12 questionnaire (iHOT-12) were recorded preoperatively and at a minimum of 2 years postoperatively. Preoperative and postoperative scores were compared between groups using a 2-tailed independent *t* test. Clinically significant outcomes were defined by achievement or failure to achieve an MCID or PASS for each of the PROs. Previously defined values of MCID and PASS thresholds for patients undergoing hip arthroscopy for FAIS were used. MCID values for HOS-ADL, HOS-SS, mHHS, and iHOT-12 were 9.7, 14.3, 9.2, and 13.9 respectively.[19] PASS thresholds for HOS-ADL, HOS-SS, mHHS, and iHOT-12 were 88.2, 76.4, 83.3, and 72.2, respectively.[19] Missing or incomplete outcome surveys were excluded from analysis (see Appendix Table A1, available in the online version of this article).

Survivorship Analysis

At the time of most recent follow-up, all patients were asked whether they underwent a revision hip arthroscopy or converted to a THA. Additional interventions for the SIJ such as corticosteroid injections were assessed through retrospective chart review. Overall survivorship was calculated for the total study population with failure defined as conversion to THA or revision hip arthroscopy.

Statistical Analysis

Continuous variables were reported as mean and standard deviation and compared between cohorts using independent 2-tailed Student *t* tests. Categorical variables were reported as percentage of the total cohort and compared between cohorts using Fisher exact tests. Significance level for all statistical measurements was set at $\alpha = .05$. Statistical analyses were conducted using SPSS Version 27.0.0

TABLE 1
Demographic and Preoperative Radiographic Characteristics Compared Between Patients With SIJ Pain and Controls Without SIJ Pain[a]

	SIJ Pain	Controls	*P* Value
N (hips)	75	150	
Age, y	35.6 ± 10.4	35.3 ± 9.8	.970
BMI	25.0 ± 4.5	25.0 ± 4.2	.979
Sex, % (female)	81.3	81.3	≥.999
Smoking, % (current or former)	17.9	13.0	.006[b]
Back pain, %	26.7	19.7	.304
Psychiatric history, %	22.5	26.0	.619
Workers' compensation, %	8.1	4.7	.364
Tönnis grade, %			≥.999
grade 0	90.4	90.4	
grade 1	9.6	9.6	
Alpha angle (AP), deg	65.4 ± 17.3	64.6 ± 17.8	.778
Alpha angle (Dunn), deg	57.5 ± 11.2	60.7 ± 14.3	.189
ACEA, deg	33.6 ± 6.5	32.4 ± 6.6	.404
LCEA, deg	30.6 ± 7.3	30.8 ± 6.5	≥.999
Tönnis angle, deg	6.9 ± 5.0	6.8 ± 4.5	.859
Crossover sign, %	6.7	7.4	.844
Ischial spine sign, %	17.3	20.1	.615
Posterior wall sign, %	28.0	28.2	.976

[a]Data are reported as mean ± SD unless otherwise indicated. ACEA, anterior center-edge angle; AP, anteroposterior; BMI, body mass index; LCEA, lateral center-edge angle; SIJ, sacroiliac joint.
[b]Statistically significant based upon a significance level of .05.

(IBM Corp). An a priori power analysis assuming an alpha error probability of .05, a medium effect size of 0.60, and a desired power of 0.90 determined a minimum of 98 patients was required. All patients provided informed consent to the use of their data for the conduct of this study.

RESULTS

Study Population

A total of 80 consecutive patients (84 hips) with SIJ pain underwent hip arthroscopy for FAIS by the senior author between January 2012 and May 2018 (see Appendix Table A2, available online). Six patients with SIJ pain were undergoing revision hip arthroscopy and therefore were excluded from the final analysis. Three patients underwent endoscopic gluteus medius repair and were likewise excluded. In total, 70 patients (75 hips) were included in the final analysis. These patients were matched 1:2 to 150 controls (150 hips) without SIJ pain.

The majority of patients with SIJ pain (81.3%) were women with a mean age and BMI of 35.6 ± 10.4 years and 25.0 ± 4.5, respectively (Table 1). The majority of controls without SIJ pain (81.3%) were also women with a mean age and BMI of 35.3 ± 9.8 years and 25.0 ± 4.2, respectively. Significantly more patients with SIJ pain (17.9% vs 13.0%) were current or former smokers at the time of surgery ($P = .006$). There were no statistically significant differences in workers' compensation status, history of back pain (not including SIJ pain), or psychiatric history between the 2 groups ($P > .05$ for all).

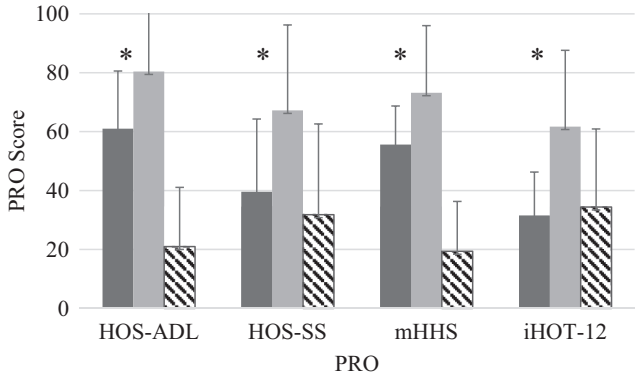

Figure 2. PRO scores for patients with sacroiliac joint pain preoperatively including baseline preoperative scores shown by the dark gray bars, 2-year postoperative scores shown by light gray bars, and delta (postoperative – preoperative) scores shown by diagonal line bars. *Statistically significant improvement ($P < .05$) from preoperative to 2 years postoperative. HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SS, Hip Outcome Score–Sports Subscale; iHOT-12, International Hip Outcome Tool–12; mHHS, modified Harris Hip Score; PRO, patient-reported outcome.

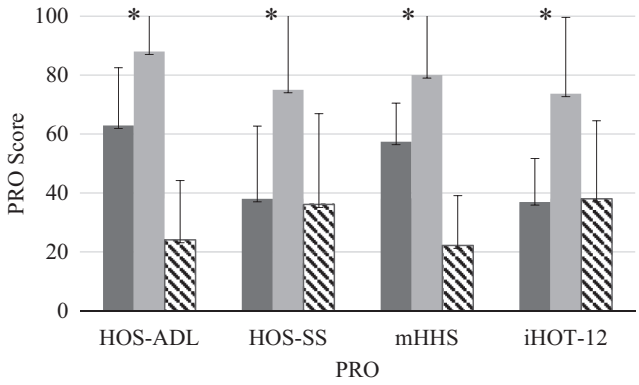

Figure 3. PRO scores for controls without sacroiliac joint pain preoperatively including baseline preoperative scores shown by the dark gray bars, 2-year postoperative scores shown by light gray bars, and delta (postoperative – preoperative) scores shown by diagonal line bars. *Statistically significant improvement ($P < .05$) from preoperative to 2 years postoperative. HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SS, Hip Outcome Score–Sports Subscale; iHOT-12, International Hip Outcome Tool–12; mHHS, modified Harris Hip Score; PRO, patient-reported outcome.

Postoperative Outcomes Analysis

Both patients with SIJ pain (Figure 2) and controls without SIJ pain (Figure 3) demonstrated statistically

TABLE 2
Preoperative, 2-Year Postoperative, and Delta (Postoperative – Preoperative) Patient-Reported Outcome Scores for Patients With SIJ Pain Compared With Patients Without SIJ Pain (Controls)[a]

	SIJ Pain	Controls	*P* Value
Preoperative			
HOS-ADL	61.0 ± 19.6	62.9 ± 18.6	.506
HOS-SS	36.9 ± 24.7	38.0 ± 23.2	.772
mHHS	55.6 ± 13.1	57.4 ± 15.5	.449
iHOT-12	31.5 ± 14.8	36.9 ± 17.8	.069
Postoperative (at 5 y)			
HOS-ADL	80.4 ± 22.4	88.0 ± 15.1	.006[b]
HOS-SS	67.2 ± 29.0	75.0 ± 24.8	.065
mHHS	73.2 ± 22.8	80.0 ± 17.3	<.001[b]
iHOT-12	61.7 ± 25.9	73.7 ± 23.7	.008[b]
Delta (5 y – preoperative)			
HOS-ADL	21.0 ± 20.1	24.1 ± 18.1	.333
HOS-SS	31.8 ± 30.8	36.1 ± 29.9	.438
mHHS	19.4 ± 16.9	22.2 ± 19.3	.413
iHOT-12	34.4 ± 26.5	38.0 ± 27.4	.515

[a]Data are reported as mean ± SD. HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SS, Hip Outcome Score–Sports Subscale; iHOT-12, International Hip Outcome Tool–12; mHHS, modified Harris Hip Score; SIJ, sacroiliac joint.
[b]Statistically significant based upon a significance level of .05.

significant improvement in PRO scores at 2 years ($P < .001$ for all). Patients with SIJ pain had lower preoperative scores for each of the 4 PROs (Table 2). However, differences in preoperative PRO scores were not statistically significant between the 2 groups ($P > .05$ for all). There were no statistically significant differences in improvement in (delta) PRO scores between the 2 groups ($P > .05$ for all). Patients with SIJ pain had significantly lower postoperative PRO scores for the HOS-ADL, mHHS, and iHOT-12 compared with controls without SIJ pain ($P < .05$ for all). Patients with SIJ pain had lower postoperative HOS-SS scores compared with controls without SIJ pain. However, differences in postoperative HOS-SS scores were not statistically significant ($P = .07$).

A majority of patients in both the SIJ pain group (64.0%) and the control group without SIJ pain (89.3%) achieved a clinically significant outcome as defined by meeting the threshold PRO scores for MCID or PASS for at least 1 of the 4 PROs. The SIJ pain group had significantly lower achievement of MCID for the HOS-ADL ($P = .04$) (Table 3). Although patients with SIJ pain achieved MCID at a lower rate for the HOS-SS, mHHS, and iHOT-12 compared with controls without SIJ pain, these differences were not statistically significant ($P > .05$ for all). The SIJ pain group also had significantly lower achievement of PASS for the mHHS ($P = .03$) and iHOT-12 ($P = .01$). Again, the SIJ pain group did have lower achievement of PASS for both the HOS-ADL and the HOS-SS, but these differences were not statistically significant ($P > .05$ for both).

TABLE 3
Achievement of MCID and PASS for Each PRO for Patients With SIJ Pain and Controls Without SIJ Pain[a]

PRO	SIJ Pain (%)	Controls (%)	*P* Value
MCID			
HOS-ADL	65.2	80.5	.044[b]
HOS-SS	67.5	76.8	.293
mHHS	65.9	75.6	.230
iHOT-12	74.2	80.6	.453
PASS			
HOS-ADL	57.6	67.1	.257
HOS-SS	48.2	58.7	.200
mHHS	27.5	45.3	.030[b]
iHOT-12	31.0	56.0	.010[b]

[a]HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SS, Hip Outcome Score–Sports Subscale; iHOT-12, International Hip Outcome Tool–12; MCID, minimal clinically importance difference; mHHS, modified Harris Hip Score; PASS, Patient Acceptable Symptom State; PRO, patient-reported outcome; SIJ, sacroiliac joint.
[b]Statistically significant based upon a significance level of .05.

Survivorship Analysis

Three patients with SIJ pain required a revision hip arthroscopic surgery, for a gross survival rate of 95.9%. One control patient converted to THA and 3 required revision hip arthroscopic surgeries, for a gross survival rate of 97.6%. On Fisher exact testing, there were no statistically significant differences in survivorship ($P = .6886$). More than a quarter (27.4%) of patients with SIJ pain later required some form of corticosteroid injection for persistent pain in the hip and buttock region. One-third of those patients received a corticosteroid injection directly to the SIJ.

DISCUSSION

A key finding in this study is the lack of significant differences in delta PRO scores demonstrating that patients with SIJ pain experience significant improvement in PROs at 2-year follow-up that is comparable with patients without SIJ. However, patients with SIJ pain demonstrated significantly lower postoperative PRO scores than patients without SIJ pain. Furthermore, patients with SIJ pain may be less likely to achieve the MCID or PASS for PROs at 2-year follow-up. Overall rates of revision surgery and/or conversion to THA were low and similar between the 2 groups.

The relationship between hip and SIJ pain is complex. The decreased hip range of motion seen in patients with FAIS is known to increase stress on the lumbar spine and SIJ, which may result in the development of pain.[6] Radiographic changes to the SIJ joint may be present in up to a quarter of patients with FAIS.[12] In a retrospective comparative cohort study from the same patient cohort previously published by the senior author, patients with radiographic SIJ abnormalities on preoperative imaging demonstrated significantly lower achievement of MCID

for the HOS-ADL and HOS-SS.[12] Hip arthroscopy for the treatment of FAIS is known to improve hip range of motion; however, it remains unclear whether this results in the resolution of lower back pain.[5]

Haskel et al[8] published a similar retrospective comparative cohort of 38 patients with lumbar spine disease undergoing hip arthroscopy. Interestingly, in contrast to our study they found no significant difference in postoperative outcomes between patients with and without lumbar spine disease. The difference in findings may be explained by the fact that the study by Haskel et al may have been underpowered to detect the difference between groups, as they did find mean PROs to be lower in the group of patients with lumbar spine disease, despite not finding a statistically significant difference. Furthermore, the mean age in the cohort of patients reported by Haskel et al was several years older than the mean age of patients reported on in this study (48.2 years vs 35.6 years); although this may also be explained by the increasing prevalence of lumbar spine disease with increasing patient age.[18,20] Last, the study by Haskel et al included patients with lumbar spine disease as opposed to SIJ pain in our study. Becker et al[3] compared outcomes between patients with and without lower back pain undergoing hip arthroscopy and found significantly lower postoperative iHOT-33 scores in patients with lower back pain. However, this study was limited by its 12-month follow-up and the fact that only patients with self-reported lower back pain were included and not those with lower back pain objectively demonstrated on physical examination.

Although patients with SIJ pain still experienced significant clinical benefit after hip arthroscopy, their inferior outcomes to patients without SIJ pain found in this study may at least in part be explained by co-existing spine pathology that is being left unaddressed during hip arthroscopy. Patients with co-existing hip and SIJ pathology may require individualized treatment for each or preoperative counseling that SIJ pain may not necessarily improve after addressing other intra-articular pathology with hip arthroscopy. Management of SIJ pain may include bracing, physical therapy, intra-articular injections, radiofrequency ablation, and/or arthrodesis.[23] Interestingly, Chandrasekaran et al[4] found that patients undergoing hip arthroscopy who had previous lumbar spine surgery had similar improvement in PROs to patients who did not have a history of lumbar spine surgery.

This study is the largest of its kind reporting on a matched cohort of patients undergoing hip arthroscopy with SIJ pain. The statistical analysis is strengthened by the matched-cohort design, which reduces the risk of confounding factors. Our analysis also has the benefit of including multiple different PROs. The results of this study highlight the importance of accurately determining the underlying cause of a patient's pain before undergoing hip arthroscopy. However, in some cases a thorough history and examination alone may not be enough to determine the source of pain, as some studies have noted the limited accuracy of clinical assessment alone at determining the presence of intra-articular hip pathology.[6] Diagnostic intra-articular hip injections may be useful in both determining the cause of the patient's pain as well as predicting the patient's outcome after hip arthroscopy.[15] Ayeni et al[1] noted a higher rate of poor outcomes after hip arthroscopy in patients who did not experience improvement in their pain after a diagnostic hip injection. In patients with SIJ pain, intra-articular hip corticosteroid injections may provide both therapeutic and diagnostic benefit by confirming an intra-articular source of pain likely to improve with hip arthroscopy rather than confirming SIJ pathology.[15,24]

There are a few important limitations of the present study worth noting. The first notable limitation is that this study does not include a radiographic assessment of SIJ pathology. The decision was made to exclude a radiographic analysis as we have previously shown in a study with an overlapping cohort that SIJ changes on any imaging modality were only weakly correlated with pain to palpation of the SIJ (r = 0.11; P = .004) on physical examination.[12] In addition, advanced imaging (ie, computed tomography or magnetic resonance imaging) was not obtained for all patients, and plain radiographs have a low sensitivity (22%) to detect SIJ pathologic changes.[25] Second, this study is primarily limited by its retrospective nature, which introduces inherit bias despite our match-controlled analysis. Third, although previously validated hip-specific PRO scores were prospectively collected, it is impossible to determine with certainty the exact extent to which SIJ pain is responsible for lower postoperative PRO scores in patients with SIJ pain preoperatively. It is likely that SIJ pain affected functional and pain components of individual PRO scores. Additionally, there was a significantly greater percentage of patients in the SIJ pain group who were current or former smokers, which has been shown to negatively influence PRO scores.[14] However, we did attempt to mitigate other possible confounding variables by using a matched analysis. There were also no significant differences in other variables known to influence PRO scores, such as a history of back pain, psychiatric history, workers' compensation status, Tönnis grade, alpha angle, and lateral center-edge angle. When interpreting the results of this study, it should be noted that all procedures were performed by a single high-volume surgeon (S.J.N.), which may introduce an element of expertise bias. The PROs used in this study are primarily used to measure hip function and pain and therefore we cannot comment on whether a patient's SIJ pain did or did not resolve after hip arthroscopy. Future studies with larger sample sizes are needed to accurately determine whether patients with SIJ pain truly have differences in rate of further procedures or revision surgery as our study was likely underpowered for this purpose.

CONCLUSION

Patients with SIJ pain, either on history or physical examination, undergoing hip arthroscopy for the treatment of FAIS experience significant improvement in PROs at 2-year follow-up that is comparable with patients without SIJ pain. However, they may be less likely to achieve the MCID or PASS and have significantly lower postoperative

PROs compared with a matched cohort of patients without SIJ pain. Overall rates of revision and conversion to THA were similarly low in both groups.

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