Influence of Cigarette Smoking at the Time of Surgery on Postoperative Outcomes in Patients With Femoroacetabular Impingement

A Matched-Pair Cohort Analysis

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Background: There is literature on the association between smoking in patients undergoing orthopaedic procedures and poor short-term outcomes. However, there are few data on smoking as an independent predictor of midterm outcomes in patients undergoing hip arthroscopic surgery for femoroacetabular impingement (FAI).

Purpose: To evaluate 2-year postoperative outcomes in patients undergoing hip arthroscopic surgery for FAI in current smokers compared with an age- and body mass index (BMI)–matched group with no smoking history.

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

Methods: Consecutive patients undergoing primary hip arthroscopic surgery for FAI between June 2012 and January 2016 were screened for smoking habits. Exclusion criteria included revision or bilateral surgery, dysplasia, and less than 2-year follow-up. Forty current smokers at the time of surgery were matched 1:2 by age and BMI to patients with no smoking history. Outcome measures included the Hip Outcome Score (HOS)–Activities of Daily Living (ADL), HOS–Sports-Specific Subscale (SSS), modified Harris Hip Score (mHHS), and visual analog scale (VAS) for pain and satisfaction. Minimal clinically important difference (MCID) and patient acceptable symptom state rates were calculated for all patients.

Results: All patients demonstrated significant improvements in all outcome measures ($P < .001$). Current smokers experienced inferior postoperative HOS-ADL (80.4 vs 89.1, respectively; $P = .013$) and HOS-SSS (65.8 vs 75.6, respectively; $P = .046$) scores and greater VAS pain scores (3.2 vs 1.8, respectively; $P = .011$) than nonsmokers. Current smoking was correlated with inferior HOS-ADL ($r = –0.27$, $P = .003$) and HOS-SSS ($r = –0.18$, $P = .046$) scores and greater VAS pain scores ($r = 0.26$, $P = .005$). Controlling for age, sex, and BMI, smoking was a significant independent predictor of postoperative HOS-ADL ($\beta = –8.7$ [95% CI, –14.3 to –3.0]; $P = .003$), HOS-SSS ($\beta = –9.8$ [95% CI, –19.5 to –0.2]; $P = .046$), and VAS pain ($\beta = 14.6$ [95% CI, 4.4 to 23.7]; $P = .005$) scores. Current smokers had lower odds of achieving the MCID for the HOS-ADL (odds ratio, 0.31 [95% CI, 0.12-0.83]; $P = .019$) and mHHS (odds ratio, 0.31 [95% CI, 0.10-0.88]; $P = .028$).

Conclusion: Current smokers had inferior postoperative HOS-ADL and HOS-SSS scores, increased pain, and lower odds of achieving the MCID for the HOS-ADL and mHHS at 2 years postoperatively than patients without any smoking history.

Keywords: smoking; cigarette; hip arthroscopic surgery; femoroacetabular impingement; hip outcomes

Despite the rate of overall cigarette smoking in the United States declining from 20.9% in 2005 to 15.5% in 2016, the Centers for Disease Control and Prevention estimate that nearly 38 million Americans still smoke regularly.[5] Furthermore, cigarette smoking remains the leading preventable cause of disease and death in the United States, killing more than 480,000 Americans each year.[5,9] While the deleterious effects of smoking on one's general health are well documented, the effects of cigarette smoking on orthopaedic outcomes and complications continue to evolve and are difficult to isolate.[1,23] While the majority of the orthopaedic literature on smoking has focused on perioperative concerns such as nonunion and delayed union of fractures, infections in total joint arthroplasty, and wound-healing complications, reports on the effects of smoking on outcomes after hip arthroscopic surgery for

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femoroacetabular impingement (FAI) are limited.[1,13] Westermann et al[25] evaluated a prospective cohort of 396 patients undergoing hip arthroscopic surgery for FAI and noted that smoking was associated with significantly lower baseline patient-reported outcome scores. In the only other study investigating the effects of smoking on hip arthroscopic surgery, Kamath et al[11] noted that smoking was a negative predictor of good or excellent outcomes. Given the rapid evolution and increase in the number of hip arthroscopic procedures performed each year, and the significant number of Americans who smoke daily, determining the effects of smoking on expected clinical outcomes is of high clinical significance.[4] Therefore, the purpose of this study was to evaluate 2-year outcomes in patients undergoing hip arthroscopic surgery for FAI in current smokers compared with an age- and body mass index (BMI)–matched group with no smoking history. Our hypothesis was that patients smoking at the time of hip arthroscopic surgery would have inferior outcomes compared with patients without a history of smoking.

METHODS

Study Design and Patient Demographics

The current study received institutional review board approval to retrospectively review a prospectively gathered clinical repository of patients undergoing hip preservation surgery for FAI. Patients undergoing primary hip arthroscopic surgery for FAI were identified in a prospectively collected repository by a single fellowship-trained surgeon (S.J.N.). Patients were enrolled between January 2012 and June 2016. Patients were followed up at the following time intervals in the postoperative period: 6 months, 1 year, and 2 years. Postoperative follow-up was conducted via online-based surveys through an encrypted data collection system (OBERD; Universal Research Solutions). Inclusion criteria for the study group consisted of a clinical diagnosis of FAI with failure of nonoperative therapies (including physical therapy and nonsteroidal anti-inflammatory drugs), a documented smoking status, and minimum 2-year clinical follow-up data. As described previously, a clinical diagnosis of FAI included positive radiographic (lateral center edge angle $>30°$, alpha angle $>50°$) and positive physical examination (eg, pain on flexion, adduction, and internal rotation) findings.[3,24] Exclusion criteria included patients undergoing revision or bilateral surgery and patients with dysplasia. Before surgery, patient demographics were collected, including sex, age, operative limb, BMI, and smoking status. Current smokers were subsequently identified and matched in a 1:2 fashion by age and BMI to patients undergoing hip arthroscopic surgery for FAI with no smoking history. This was accomplished by taking the mean age and BMI of current smokers and identifying a group of patients with no smoking history who met the same inclusion and exclusion criteria of the study group with a statistically similar age and BMI profile.

Patient-Reported Outcomes

Patient-reported outcomes obtained preoperatively and at 2-year follow-up included the Hip Outcome Score (HOS)–Activities of Daily Living (ADL), HOS–Sports-Specific Subscale (SSS), modified Harris Hip Score (mHHS), and visual analog scale (VAS) for pain and satisfaction scores.[17] Minimal clinically important difference (MCID) standards were set to 8 for the mHHS, 9 for the HOS-ADL, and 6 for the HOS-SSS.[16] Patient acceptable symptom state (PASS) thresholds were set to 74 for the mHHS, 87 for the HOS-ADL, and 75 for the HOS-SSS.[6]

Surgical Technique

Arthroscopic hip surgery for all patients was performed under general anesthesia in the supine position on a standard traction table. The central compartment was accessed through the anterolateral and midanterior portals. Interportal capsulotomy was performed as needed based on the amount of residual capsule present, from approximately 12 o'clock to 2 o'clock. Diagnostic arthroscopic surgery was then performed with inspection of the labrum, chondral surfaces, acetabular rim, and remaining capsule. Associated abnormalities were treated as indicated. Traction was released and the peripheral compartment inspected. All patients underwent T-capsulotomy above the zona orbicularis through the distal anterolateral accessory portal to enable appropriate femoral neck visualization. Femoral osteochondroplasty was then performed as indicated for residual cam lesions. Both direct arthroscopic visualization and a dynamic fluoroscopic examination were used to confirm the absence of any residual deformities and restoration of the suction seal. All patients then underwent capsular plication with No. 2 high-strength nonabsorbable sutures that started with the longitudinal portion of the T-capsulotomy site and subsequent closure of the interportal capsulotomy site using a capsular closure device (SlingShot Suture Manager, Stryker).

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Postoperative Rehabilitation

Postoperatively, all patients were given a fitted hip brace to limit flexion, abduction, and extension and were instructed on flatfoot weightbearing on the operative side to 20 lb for 3 weeks. In addition, a night splint was used for 4 weeks to limit foot rotation. Circumduction was allowed in the first 3 weeks; however, patients were instructed to avoid sitting for longer than 30 minutes during this time. After 3 weeks, crutches were discontinued, and patients could begin full weightbearing as tolerated.

Physical therapy began on postoperative day 1, per the senior surgeon's protocol, based on the procedure performed. This consisted of motion initiation, followed by soft tissue mobilization, isometrics, and stretching. The goal was symmetric hip range of motion by 8 weeks postoperatively. An emphasis was then placed on the gradual reintroduction of functional exercises alongside increasing ambulation.

Statistical Analysis

Statistical analysis was performed using SPSS statistical software (version 22.0; IBM). An a priori power analysis was performed to determine the minimum sample size required to overcome type II errors. Using the study population and difference in outcome scores (Lysholm score) of a previous sports surgery study analyzing the effects of smoking on clinical outcomes,[13] the established minimum sample size per group for a 2-tailed *t* test analysis was 38. Continuous variables were presented as means with SDs and 95% CIs. Categorical variables were presented as frequencies and percentages. Paired *t* tests were used to determine if postoperative patient-reported outcome scores were statistically different from preoperative scores among the entire patient cohort. Independent *t* tests were used to determine if statistically significant differences existed in continuous variables between the smoking and nonsmoking groups. Chi-square analyses were used to determine whether there were associations between the (1) MCID and smoking and (2) PASS and smoking. Statistical significance was set at $\alpha = .05$.

RESULTS

Of the 1096 patients treated for FAI within the senior surgeon's prospectively collected data repository during the study period, 40 patients met inclusion and exclusion criteria and were current smokers. Five (11.1%) current smokers were lost to follow-up, and 61 (5.6%) patients were excluded from the total patient population for not having a smoking status recorded. After application of the 1:2 matching algorithm, 80 patients composed the matched comparison group. In total, 73 (60.8%) were female, and the mean age was 37.3 ± 6.0 years, mean BMI was 25.4 ± 4.2 kg/m^2, and mean follow-up was 33.7 ± 3.1 months (range, 24-64 months). All clinical outcome measures demonstrated statistically significant improvements when comparing 2-year postoperative to preoperative scores (Table 1). The improvement was also seen in all patients when stratified by smoking status.

TABLE 1
Preoperative and Postoperative Patient-Reported Outcome Scores[a]

	Preoperative	Postoperative	*P* Value
All patients			
HOS-ADL	65.8 ± 21.3	86.5 ± 16.5	**<.001**
HOS-SSS	46.0 ± 24.2	74.7 ± 22.2	**<.001**
mHHS	59.2 ± 12.8	63.6 ± 15.7	**<.001**
VAS pain	6.9 ± 2.0	2.1 ± 2.4	**<.001**
VAS satisfaction	—	72.9 ± 20.5	—
Smokers			
HOS-ADL	60.5 ± 25.0	80.4 ± 19.9	**<.001**
HOS-SSS	42.2 ± 21.9	65.8 ± 17.1	**<.001**
mHHS	58.9 ± 13.0	74.5 ± 21.8	**<.001**
VAS pain	6.9 ± 2.3	3.2 ± 2.9	**<.001**
VAS satisfaction	—	74.3 ± 29.0	—
Nonsmokers			
HOS-ADL	68.5 ± 19.0	86.8 ± 16.3	**<.001**
HOS-SSS	47.8 ± 22.7	75.1 ± 25.3	**<.001**
mHHS	57.1 ± 15.0	63.2 ± 36.7	**<.001**
VAS pain	6.7 ± 1.9	2.0 ± 2.3	**<.001**
VAS satisfaction	—	71.3 ± 32.5	—

[a]Data are presented as mean ± SD. Bold values are statistically significant ($P < .05$). HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sports-Specific Subscale; mHHS, modified Harris Hip Score; VAS, visual analog scale.

Comparison of Smokers and Nonsmokers

The demographics and patient-reported outcome scores of all nonsmokers in the database were compared with the 40 smokers. The results are summarized in Table 2. Briefly, there was a statistically significant difference between smokers and nonsmokers for HOS-ADL (80.4 ± 19.9 vs 86.8 ± 16.3, respectively; $P = .016$), HOS-SSS (65.8 ± 17.1 vs 75.1 ± 25.3, respectively; $P = .023$), mHHS (74.5 ± 21.8 vs 63.2 ± 36.7, respectively; $P = .003$) scores as well as VAS pain scores (3.2 ± 2.9 vs 2.0 ± 2.3, respectively; $P = .018$). There was no significant difference in VAS satisfaction scores between the 2 groups.

Matched-Pair Analysis of Smoking Versus Nonsmoking

Forty patients were self-reported as currently smoking at the time of hip arthroscopic surgery, and these patients were subsequently matched 1:2 by age and BMI to 80 patients with no self-reported smoking history (Table 3). Intraoperative findings and surgical procedures are listed in Table 4. There were no significant differences in any intraoperative findings and surgical procedures between the 2 groups. Patients who were smokers at the time of hip arthroscopic surgery had inferior postoperative HOS-ADL (80.4 vs 86.8, respectively; $P = .013$) and HOS-SSS (65.8 vs 75.1, respectively; $P = .046$) scores as well as

TABLE 2
Demographics and Patient-Reported Outcome Scores for Smokers and All Nonsmokers in Database[a]

	Smokers	Nonsmokers	All Patients	*P* Value
Overall, n (%)	40 (3.6)	1062 (96.4)	1102 (100.0)	
Demographics				
Age, y	35.5 ± 6.4	31.6 ± 12.3	31.8 ± 12.2	**.02**
BMI, kg/m^2	27.0 ± 7.9	23.9 ± 9.2	24.0 ± 9.1	**.037**
Female sex, n (%)	24 (60.0)	698 (65.7)	722 (65.5)	.19
Postoperative scores				
HOS-ADL	80.4 ± 19.9	86.8 ± 16.3	86.5 ± 16.5	**.016**
HOS-SSS	65.8 ± 17.1	75.1 ± 25.3	74.7 ± 25.5	**.023**
mHHS	74.5 ± 21.8	63.2 ± 36.7	63.6 ± 46.3	**.003**
VAS pain	3.2 ± 2.9	2.0 ± 2.3	2.1 ± 2.4	**.018**
VAS satisfaction	74.3 ± 29.0	71.3 ± 32.5	72.9 ± 32.1	.12

[a]Data are presented as mean ± SD unless otherwise specified. Bold values are statistically significant ($P < .05$). BMI, body mass index; HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sports-Specific Subscale; mHHS, modified Harris Hip Score; VAS, visual analog scale.

TABLE 3
Demographics for Smokers and Nonsmokers[a]

	Smokers	Nonsmokers	*P* Value
Age, y	35.5 ± 6.4	36.1 ± 2.1	.27
BMI, kg/m^2	27.0 ± 7.9	24.6 ± 2.5	.097
Sex, n (%)			.51
Male	16 (40.0)	31 (38.8)	
Female	24 (60.0)	49 (61.2)	
Operative limb, n (%)			.061
Left	29 (72.5)	47 (58.8)	
Right	11 (27.5)	33 (41.2)	

[a]Data are presented as mean ± SD unless otherwise specified. BMI, body mass index.

TABLE 4
Intraoperative Findings and Surgical Procedures[a]

	Smokers	Nonsmokers	*P* Value
Intraoperative findings			
Cartilage delamination	9 (22.5)	14 (17.5)	.32
Chondromalacia			
Grade I	2 (5.0)	1 (1.3)	.29
Grade II	1 (2.5)	5 (6.3)	.47
Grade III	3 (7.5)	7 (8.8)	.84
Grade IV	0 (0.0)	1 (1.3)	.52
Capsular adhesions			
Cam deformity	40 (100.0)	80 (100.0)	.97
Pincer deformity	40 (100.0)	80 (100.0)	.97
Surgical procedures			
Labral repair	40 (100.0)	80 (100.0)	.97
Acetabular rim trimming	38 (95.0)	80 (100.0)	.91
Femoral osteochondroplasty	40 (100.0)	80 (100.0)	.97
Capsular plication	40 (100.0)	80 (100.0)	.97
Trochanteric bursectomy	1 (2.5)	3 (3.8)	.86
Synovectomy	40 (100.0)	80 (100.0)	.97

[a]Data are presented as n (%).

TABLE 5
Independent *t* Test Analysis of Preoperative and Postoperative Patient-Reported Outcome Scores[a]

	Smokers	Nonsmokers	*P* Value
Preoperative			
HOS-ADL	60.5 ± 25.0	68.5 ± 19.0	.061
HOS-SSS	42.2 ± 21.9	47.8 ± 22.7	.078
mHHS	58.9 ± 13.0	57.1 ± 15.0	.12
VAS pain	6.9 ± 2.3	6.7 ± 1.9	.54
Postoperative			
HOS-ADL	80.4 ± 19.9	89.1 ± 11.4	**.013**
HOS-SSS	65.8 ± 17.1	75.6 ± 14.1	**.046**
mHHS	74.5 ± 21.8	80.3 ± 14.2	.14
VAS pain	3.2 ± 2.9	1.8 ± 2.2	**.011**
VAS satisfaction	74.3 ± 29.0	81.8 ± 22.6	.14

[a]Data are presented as mean ± SD. Bold values are statistically significant ($P < .05$). HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sports-Specific Subscale; mHHS, modified Harris Hip Score; VAS, visual analog scale.

greater VAS pain scores (3.2 vs 2.0, respectively; $P = .011$) than patients without a smoking history (Table 5).

MCID and PASS

When considering the percentage of patients who were smokers and nonsmokers at the time of hip arthroscopic surgery, it was found that there were statistically significant associations between nonsmokers and achieving the MCID for the HOS-ADL and mHHS (Table 6). Similarly, when considering the percentage of patients who achieved the PASS, there was a statistically significant association between nonsmokers and achieving the PASS for the HOS-ADL and mHHS.

TABLE 6
MCID and PASS Rates[a]

	Smokers	Nonsmokers	*P* Value
MCID			
HOS-ADL	64.6	77.8	**<.001**
HOS-SSS	80.8	85.7	.078
mHHS	72.2	83.4	**<.001**
PASS			
HOS-ADL	55.1	67.8	**<.001**
HOS-SSS	69.2	62.4	.14
mHHS	65.2	74.6	**<.001**

[a]Data are presented as %. Bold values are statistically significant ($P < .05$). HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sports-Specific Subscale; MCID, minimal clinically important difference; mHHS, modified Harris Hip Score; PASS, patient acceptable symptom state.

TABLE 7
Binary Logistic Regression Analysis for Smoking and MCID/PASS Rates[a]

	Odds Ratio (95% CI)	*P* Value
MCID and smoking		
HOS-ADL	0.31 (0.12-0.83)	**.019**
HOS-SSS	0.92 (0.86-1.94)	.23
mHHS	0.31 (0.10-0.88)	**.028**
PASS and smoking		
HOS-ADL	0.42 (0.10-0.78)	**.004**
HOS-SSS	0.89 (0.64-2.18)	.33
mHHS	0.46 (0.18-0.91)	**.032**

[a]Bold values are statistically significant ($P < .05$). HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sports-Specific Subscale; MCID, minimal clinically important difference; mHHS, modified Harris Hip Score; PASS, patient acceptable symptom state.

Binary Logistic Regression Analysis

The logistic regression analysis revealed that patients who were smokers experienced a lower likelihood of achieving the MCID for the HOS-ADL (odds ratio [OR], 0.31 [95% CI, 0.12-0.83]; $P = .019$) and mHHS (OR, 0.31 [95% CI, 0.10-0.88]; $P = .028$) (Table 7). This group did not have a lower likelihood of achieving the MCID for the HOS-SSS ($P = .23$). Patients who were smokers at the time of hip arthroscopic surgery also experienced a lower likelihood of achieving the PASS for the HOS-ADL (OR, 0.42 [95% CI, 0.10-0.78]; $P = .004$) and mHHS (OR, 0.46 [95% CI, 0.18-0.91]; $P = .032$). However, this group did not have a lower likelihood of achieving the PASS for the HOS-SSS ($P = .33$).

DISCUSSION

The main findings of this study were that current smokers had inferior postoperative HOS-ADL and HOS-SSS scores, increased pain, and lower odds of achieving the MCID for the HOS-ADL and mHHS at 2 years postoperatively than patients without any smoking history.

Several patient-specific and intraoperative findings have been correlated with inferior outcomes after hip arthroscopic surgery for FAI.[18] However, smoking at the time of hip arthroscopic surgery has yet to be fully evaluated as an independent risk factor for inferior outcomes at 2 years after surgery. The present study examined the largest cohort of smokers undergoing hip arthroscopic surgery for FAI using modern techniques, including labral repair and capsular closure, with 2-year patient-reported outcomes. Our results are consistent with the broader, aforementioned arthroscopic literature on smokers that report improved but inferior outcomes compared with nonsmokers. In addition, smokers were less likely to achieve the MCID for the HOS-ADL and mHHS.

While the negative effects of smoking on perioperative complications are well established, fewer researchers have studied its effects on patient-reported outcomes after arthroscopic surgery.[13,19,21] Multiple studies have reported increased side-to-side laxity and inferior International Knee Documentation Committee scores, Lysholm scores, and subjective functional scores after anterior cruciate ligament reconstruction in smokers compared with nonsmokers.[12,13] Similarly, Mallon et al[15] reported that smoking had a negative effect on clinical outcome scores after arthroscopic rotator cuff repair. While it would be expected that a similar trend would exist in current smokers undergoing hip arthroscopic surgery, this relationship has yet to be fully examined. Westermann et al[25] examined a prospective cohort of 396 patients undergoing hip arthroscopic surgery for FAI and performed a multivariate regression analysis to determine the effect of patient-related factors on preoperative patient-reported outcomes. The authors noted that smoking was independently associated with an increased Hip Disability and Osteoarthritis Outcome Score (HOOS) for pain preoperatively, a worse preoperative HOOS–physical function short form score, and a lower preoperative Veterans RAND 12-Item Health Survey score. Similarly, Potter et al[20] also reported that smoking was associated with significantly lower baseline function and pain scores in 147 patients undergoing hip arthroscopic surgery for FAI. In one of the few studies correlating smoking status to outcome scores, Kamath et al[11] reported on 52 patients undergoing hip arthroscopic surgery for labral tears. The authors showed that smoking was a significant negative predictor of good or excellent outcomes, which were considered to be greater than 80 on the mHHS. Of the study cohort, 8 patients were current smokers at the time of surgery. In regard to treatment, only 3 patients within the cohort of 52 underwent labral repair, with the remainder undergoing labral debridement. Thus, the current study may not reflect more modern hip arthroscopic techniques and labral management strategies.

There are several pathophysiological processes interrupted by cigarette smoke that could negatively influence the outcomes of hip arthroscopic surgery for FAI. Nicotine contained in cigarettes causes vasoconstriction, which leads to microperfusion of capillary beds, reducing the

amount of oxygen delivered to healing, damaged tissue such as the labrum after repair. Furthermore, carbon monoxide competitively inhibits the ability of hemoglobin to bind oxygen, significantly reducing oxidative metabolism and collagen production at the cellular level.[22] The combined effects of these chemicals at the cellular level may result in less reliable healing of repaired structures, such as the labrum and hip capsule, after surgery, resulting in inferior functional outcomes and satisfaction compared with nonsmokers. Park et al[19] recently reported that smokers at the time of rotator cuff surgery showed a significantly higher failure rate than a matched nonsmoker group after reimaging 34 smokers. In addition to microvasculature constriction and decreased oxygen transport, cigarette smoke has been shown to augment the production of numerous proinflammatory cytokines and autoantibodies, which signal pain in the central nervous system.[2,8] While there are numerous mechanisms that could explain inferior functional and subjective outcomes after hip arthroscopic surgery in smokers, the exact pathophysiology is most likely multifactorial and complex. Despite this, establishing the relationship between smoking and outcomes after hip arthroscopic surgery is significant, and this information should be used clinically to counsel patients on expected outcomes and should be identified and controlled for in future studies evaluating patient-reported outcomes.

Although the current study only confirms a strong statistical association between smoking and inferior postoperative outcomes in this patient population secondary to inherent limitations of the study design, smoking was found to be an independent predictor of a decreased likelihood of achieving a clinically significant functional outcome per the MCID and PASS for the HOS-ADL and mHHS. Unlike other risk factors associated with inferior outcomes and clinically significant improvement such as age, sex, and revision procedures,[7,10,14] the current study has identified a preoperative, modifiable risk factor for inferior outcomes that may allow patients to improve their surgical candidacy and propensity for postoperative outcome improvement with behavioral modification. Therefore, current smokers should be counseled preoperatively on expected outcomes after surgery. Future studies are warranted to determine the length of an appropriate preoperative smoking cessation period to equalize successful outcomes in comparison with patients without a smoking history.

Limitations

The present study is not without limitations. Although this study utilized prospectively collected data, smoking status was collected in a qualitative manner, precluding the calculation of pack-per-year data. Further studies should aim to better quantify smoking habits to determine if there is a threshold level of smoking in the perioperative period that leads to the inferior outcomes identified in the current study. Furthermore, despite performance of a regression analysis, the relationship between smoking and inferior functional outcome scores reported in this study is likely multifactorial and could be caused by the overall poor general health condition of smokers. Future studies should examine the effects of nicotine and other toxins in cigarette smoke on healing tissues specific to the hip. Finally, our sample size is relatively small. Further multicenter studies should be performed to increase the number of patients to limit the possibility of type I errors.

CONCLUSION

Current smokers had inferior postoperative HOS-ADL and HOS-SSS scores, increased pain, and lower odds of achieving the MCID for the HOS-ADL and mHHS at 2 years postoperatively than patients without any smoking history.

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