Does Obesity Affect Outcomes After Hip Arthroscopy?

A Cohort Analysis

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Background: Obesity presents a challenging problem in surgical treatment and has led to poorer postoperative outcomes. The purpose of this study was to evaluate whether hip arthroscopy in the obese patient influences postoperative clinical and patient-reported outcome scores.

Methods: From February 2008 to February 2012, data were collected prospectively on all patients undergoing primary hip arthroscopy. A total of 680 patients were included. All patients were assessed preoperatively and postoperatively with four patient-reported outcome measures. Pain was estimated on the visual analog scale. The patient satisfaction score was measured. Three groups were stratified by body mass index. The non-obese group, those with a body mass index of <30 kg/m^2 (mean, 23.61 kg/m^2), included 562 patients with a mean age of 34.78 years. The class-I obese group, those with a body mass index of ≥30 to 34.9 kg/m^2 (mean, 33.85 kg/m^2), included ninety-four patients with a mean age of 44.02 years. The class-II obese group, those with a body mass index of ≥35 to 39.9 kg/m^2 (mean, 39.11 kg/m^2), included twenty-four patients with a mean age of 39.33 years.

Results: In the non-obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 63.41 to 83.81 points for the modified Harris hip score, 60.86 to 83.62 points for the Non-Arthritic Hip Score, 66.24 to 86.24 points for the Hip Outcome Score Activities of Daily Living, and 44.01 to 73.26 points for the Hip Outcome Score Sport-Specific Subscale. In the class-I obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 54.81 to 75.95 points for the modified Harris hip score, 48.98 to 72.51 points for the Non-Arthritic Hip Score, 53.22 to 72.99 points for the Hip Outcome Score Activities of Daily Living, and 30.56 to 60.75 points for the Hip Outcome Score Sport-Specific Subscale. In the class-II obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 50.81 to 80.01 points for the modified Harris hip score, 42.36 to 72.50 points for the Non-Arthritic Hip Score, 48.11 to 74.73 points for the Hip Outcome Score Activities of Daily Living, and 28.25 to 62.56 points for the Hip Outcome Score Sport-Specific Subscale. Traction time did not vary significantly between groups ($p < 0.05$).

Conclusions: Our study demonstrated that obese patients started with lower absolute scores preoperatively and ended with lower overall absolute postoperative scores. However, obese patients showed substantial benefit from hip arthroscopy and demonstrated a degree of improvement that was similar to that of the control non-obese group.

Level of Evidence: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

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Body mass index (BMI) is used to classify overweight and obese adults measured in kilograms per meters squared. Overweight is classified[1] as a BMI of ≥25 kg/m^2 and obesity is defined[1] as a BMI of ≥30 kg/m^2. Obesity is subdivided into class I (30 to 34.9 kg/m^2), defined as moderate obesity; class II (35 to 39.9 kg/m^2), defined as severe obesity; and class III (≥40 kg/m^2),

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TABLE I Demographic Patient Characteristics

	Non-Obese Group (N = 562)	Class-I Obese Group (N = 94)	P Value*	Class-II Obese Group (N = 24)	P Value†
Height‡ *(m)*	1.71	1.72	0.21	1.68	0.212
Weight‡ *(kg)*	69.1	100	<0.05	101.8	<0.05
BMI‡ *(kg/m²)*	23.63	33.80	<0.05	36.07	<0.05
Age‡ *(yr)*	34.78	44.02	<0.05	39.33	0.12
Male sex§	176 (31.3%)	42 (44.7%)	0.019	7 (29.2%)	0.823
Right side§	294 (52.3%)	54 (57.4%)	0.356	16 (66.7%)	0.168
Traction time‡ *(min)*	60.29	64.39	0.157	67.10	0.218
Follow-up time‡ *(yr)*	2.51	2.52	0.9	2.34	0.309
Patients undergoing follow-up#	88%	80%		71%	

*The p values are compared between the non-obese and the class-I obese group. †The p values are compared between the class-II obese group and the class-I obese and non-obese groups. ‡The values are given as the mean. §The values are given as the number of patients, with the percentage in parentheses. #The values are given as the percentage.

defined as morbid obesity. Obesity has poorer postoperative outcomes in a variety of orthopaedic surgical procedures[2,3]. Harrison et al.[4] found that obese patients had worse physical functioning on the Short Form-36 (SF-36) compared with non-obese patients after arthroscopic debridement or partial meniscectomy. In anterior cruciate ligament reconstruction surgery, obesity is associated with poorer outcomes[5-8]. There has been a paucity of studies focused on hip arthroscopy in the obese patient, and there have been few studies showing the conversion to total hip arthroplasty and revision surgery rates with regards to the obese patient after primary hip arthroscopy.

The purpose of this study was to evaluate whether hip arthroscopy in the obese patient affects postoperative clinical and patient-reported outcome scores. Our null hypothesis was that obese patients undergoing primary hip arthroscopy would have clinical and patient-reported outcome scores that were similar to those of non-obese patients.

Materials and Methods

During the study period, February 2008 to February 2012, data were collected prospectively on all patients undergoing primary hip arthroscopy by the senior surgeon (B.G.D.). Inclusion criteria were patients who underwent primary hip arthroscopy during the study period with a two-year follow-up with radiographs and patient-reported outcome scores. Exclusion criteria were revision surgical procedures, osteoarthritis classified as a Tönnis grade[9] of >1, previous hip conditions such as Legg-Calvé-Perthes disease, osteonecrosis, and prior surgical intervention (see Appendix). Clinically, all patients had signs and symptoms of a labral tear for longer than three months with unsuccessful nonoperative treatment. Signs and symptoms of a labral tear included groin pain, pain surrounding the hip, and positive impingement tests. Nonoperative treatment included a minimum of six weeks of physical therapy. Radiographs were made for all patients prior to surgery. Patients also underwent preoperative magnetic resonance imaging (MRI) or magnetic resonance arthrogram to confirm labral pathology. The patient-reported outcome scores used included the modified Harris hip score, the Non-Arthritic Hip Score[10], the Hip Outcome Score Activities of Daily Living, and the Hip Outcome Score Sport-Specific Subscale and were collected during the preoperative visit and at the follow-up visits at three months, one year, and two years. All four questionnaires were utilized, as there is no conclusive evidence for the use of a single patient-reported outcome questionnaire for patients undergoing hip arthroscopy[11,12]. Pain was estimated on a visual analog scale from 0 to 10 points (with 10 points being the worst), and satisfaction with surgery was rated on a scale of 0 to 10 points. Three groups were created on the basis of BMI. A control group, the non-obese group, was composed of patients with a BMI of <30 kg/m², and two study groups were created with patients with a BMI of ≥30 to 34.9 kg/m² (the class-I obese group) and those with a BMI of ≥35 to 39.9 kg/m² (the class-II obese group). Institutional review board approval and exemption to obtain informed consent for patient exclusion were received for this study.

Physical Examination

A detailed physical examination of the hips was performed preoperatively with an assessment of the passive range of motion, including flexion, abduction, and internal and external rotation. Internal and external rotation was measured with the patient supine with both the hip and knee flexed 90°. The anterior impingement test was considered positive if pain was elicited in forced flexion combined with internal rotation of the hip as previously described by Byrd[13]. The lateral impingement test was considered positive if symptoms were produced in forced abduction with external rotation. The posterior impingement test was considered positive if pain was elicited with the hip passively extended by hanging over the examination table and then the leg externally rotated with the opposite limb in a neutral position. The evaluation of internal snapping of the iliopsoas tendon was performed as the hip was brought from a flexed, abducted, and externally rotated position into extension with internal rotation[13]. All hip examination findings were documented in degrees by the senior surgeon (B.G.D.) in a clinical setting.

Surgical Technique

All hip arthroscopies were performed by the senior author (B.G.D.) in a tertiary referral setting dedicated to hip preservation. All surgical procedures were performed with the patient in the modified supine position with use of a minimum of two portals (standard anterolateral and mid-anterior)[14-16]. After the establishment of portals and capsulotomy, a diagnostic arthroscopy was performed. If the soft-tissue envelope was sufficiently large to preclude the use of a standard 70° 160-mm Direct View Arthroscope 4.0 mm (Smith & Nephew, London, United Kingdom), a 70° 280-mm Direct View Arthroscope 4.0 mm (Smith & Nephew) was used for visualizing the hip joint.

Osseous pathology was corrected under fluoroscopic guidance. Acetabuloplasty was performed for pincer impingement, and femoral neck osteoplasty was performed for cam impingement. Labral tears were repaired when indicated or were selectively debrided until a stable labrum was achieved while preserving as much labrum as possible. If there was full-thickness articular cartilage damage, a microfracture was performed according to the Steadman technique[17,18].

TABLE II Preoperative Physical Examination Findings

	Non-Obese Group (N = 562)	Class-I Obese Group (N = 94)	P Value*	Class-II Obese Group (N = 24)	P Value†
Anterior impingement‡	511 (91%)	87 (93%)	0.61	22 (92%)	0.65
Lateral impingement‡	311 (55%)	52 (55%)	0.74	13 (54%)	0.77
Posterior impingement‡	188 (33%)	40 (43%)	0.14	10 (42%)	0.48
Internal hip click‡	136 (24%)	9 (10%)	0.001	0 (0%)	0.005
Internal rotation§ *(deg)*	25.15	20.71	0.009	22.08	0.33
External rotation§ *(deg)*	52.84	49.51	0.05	48.75	0.19
Abduction§ *(deg)*	46.59	43.71	0.25	43.33	0.17
Flexion§ *(deg)*	120.48	110.43	<0.001	107.50	<0.001

*The p values are compared between the non-obese group and the class-I obese group. †The p values are compared between the class-II obese group and the class-I obese and non-obese groups. ‡The values are given as the number of patients, with the percentage in parentheses, who had positive findings. §The values are given as the mean.

Rehabilitation Protocol

For the first two weeks, the patients were placed in a hip brace with limited motion from 0° to 90° flexion at all times. Patients were placed on 20-pound (9.07-kg), flatfoot, weight-bearing restrictions on the operative side for a minimum of two weeks. If a capsular plication was performed with borderline dysplasia or a gluteus medius repair was performed, the weight-bearing restrictions were extended for a total of six weeks. If a microfracture was performed, the patient was placed on eight-week weight-bearing restrictions. All patients started physical therapy on the first postoperative day to initiate hip motion. Physical therapy consisted of using a continuous passive motion machine for four hours per day or using a stationary bike for two hours per day.

End Points

Clinical end points were defined as the occurrence of a revision hip arthroscopy or conversion to total hip arthroplasty or a hip-resurfacing procedure during the study period.

Statistical Analysis

A power analysis was performed, and it was estimated that a clinically important difference between groups for the modified Harris hip score would be 6.0, with a standard deviation of 8.0 for the preoperative group[19]. To obtain a power of ≥0.80, we would need a minimum of forty-six hips combined in both groups. A two-tailed paired t test was used to assess differences between preoperative and postoperative scores for the individual groups. The independent t test was used to compare the mean change in patient-reported outcome scores (change from preoperative to postoperative score) between the non-obese and obese groups. Significance was set at $p < 0.05$. Statistical analysis was performed with use of Microsoft Excel 2007 (Microsoft, Redmond, Washington) and IBM SPSS version 12.0 for Windows (SPSS, Chicago, Illinois).

Source of Funding

No external funding was received.

Results

Demographic Characteristics

A total of 680 patients were included, of whom 225 (33.1%) were male and 455 (66.9%) were female. Three groups were created on the basis of BMI classification: non-obese (those with a BMI of <30 kg/m^2), class-I obese (those with a BMI of ≥30 to 34.9 kg/m^2), and class-II obese (those with a BMI of ≥35 to 39.9 kg/m^2) (Table I). There were 562 patients (82.6%) in the non-obese group, ninety-four patients (13.8%) in the class-I obese group, and twenty-four patients (3.5%) in the class-II obese group. The mean BMI was 23.61 kg/m^2 for the non-obese group, 33.85 kg/m^2 for the class-I obese group, and 39.11 kg/m^2 for the class-II obese group. There was a significant

TABLE III Preoperative Radiographic Findings

	Non-Obese Group*	Class-I Obese Group*	P Value†	Class-II Obese Group*	P Value‡
Joint space *(mm)*	3.5	3.7	0.12	3.8	0.11
Crossover	16.22%	10.18%	0.01	10.42%	0.24
Acetabular inclination *(deg)*	3.92	4.51	0.39	5.15	0.36
Lateral center edge angle *(deg)*	29.41	30.58	0.18	27.85	0.37
Anterior center edge angle *(deg)*	30.40	33.65	0.021	32.22	0.51
Alpha angle (Dunn view) *(deg)*	57.34	56.9	0.78	54.46	0.37

*The values are given as the average. †The p values are compared between the non-obese group and the class-I obese group. ‡The p values are compared between the non-obese group and the class-II obese group.

TABLE IV Procedures Performed

Procedure	Non-Obese Group* (N = 562)	Class-I Obese Group* (N = 94)	P Value†	Class-II Obese Group* (N = 24)	P Value‡
Labral repair	354 (63.0%)	39 (41.5%)	<0.05	11 (45.8%)	0.08
Labral debridement	178 (31.7%)	43 (45.7%)	<0.05	11 (45.8%)	0.15
Labral reconstruction	7 (1.2%)	2 (2.1%)	0.5	0 (0.0%)	0.58
Acetabuloplasty	416 (74.0%)	72 (76.6%)	0.6	19 (79.2%)	0.57
Femoroplasty	352 (62.6%)	66 (70.2%)	0.16	17 (70.8%)	0.42
Iliopsoas release	205 (36.5%)	22 (23.4%)	0.01	5 (20.8%)	0.12
Trochanteric bursectomy	43 (7.7%)	14 (14.9%)	0.02	4 (16.7%)	0.02
Synovectomy	82 (14.6%)	29 (30.9%)	<0.01	6 (25%)	0.16
Ligamentum teres debridement	263 (46.8%)	41 (43.6%)	0.57	13 (54.2%)	0.48
Loose body removal	58 (10.3%)	14 (14.9%)	0.19	4 (16.7%)	0.32
Excision bone cyst (acetabulum)	3 (0.53%)	1 (1.1%)	0.54	0 (0.0%)	0.32
Excision bone cyst (femur)	11 (2.0%)	5 (5.3%)	0.05	1 (4.2%)	0.45
Piriformis release	2 (0.36%)	0 (0.0%)	0.56	0 (0.0%)	0.77
Sciatic neurolysis	4 (0.71%)	1 (1.2%)	0.72	0 (0.0%)	0.68
Iliotibial band release	5 (0.89%)	1 (1.2%)	0.87	0 (0.0%)	0.64
Capsular plication	278 (49.5%)	19 (20.2%)	<0.01	5 (20.8%)	0.02
Capsular release	247 (44.0%)	66 (70.2%)	<0.01	15 (62.5%)	0.47

*The values are given as the number of patients, with the percentage in parentheses. †The p values are compared between the non-obese group and the class-I obese group. ‡The p values are compared between the non-obese group and the class-II obese group.

difference ($p < 0.05$) in BMI between both the class-II obese group and the class-I obese group when compared with the non-obese group. The mean patient age was 34.8 years in the non-obese group, 44.0 years in the class-I obese group, and 39.3 years in the class-II obese group. The age difference was significant ($p < 0.001$) between the non-obese group and the class-I obese group. Traction time did not vary significantly between groups ($p \geq 0.05$).

Physical Examination Findings

The preoperative physical examination findings are shown in Table II. There was no significant difference ($p \geq 0.05$) between the groups with regards to anterior, posterior, or lateral impingement. The non-obese group had a significantly higher preoperative internal hip click than both obese groups ($p < 0.05$). The non-obese group had a greater overall preoperative range of motion than either obese group.

Imaging Findings

On preoperative radiographic examination, the mean medial joint space was 3.5 mm for the non-obese group, 3.7 mm for the class-I obese group, and 3.8 mm for the class-II obese group (Table III). The mean lateral center-edge angle was 29.42° for the non-obese group, 30.58° for the class-I obese group, and 27.85° for the class-II obese group. All preoperative radiographic measurements were similar except for crossover percentage and anterior center edge angle for the non-obese group. There was no difference in Tönnis grades in the non-obese group and the class-I and class-II obese groups (see Appendix).

Operative Findings

The main surgical procedures performed are summarized in Table IV. There were a higher percentage of labral repairs in the control group with a higher percentage of labral debridements performed in the two obese groups. There was a higher percentage of trochanteric bursectomy performed in both obese groups compared with the control group. With regard to capsular management, there were a higher percentage of patients in the control group who had a capsular plication or repair performed compared with both obese groups, which had higher rates of capsular release.

Clinical Outcomes

Of the 680 patients, postoperative follow-up surveys were completed for 587 patients (86.3%) (Table V). Follow-up was obtained for 495 patients (88.1%) in the non-obese group, with a mean follow-up duration of 2.51 years; seventy-five patients (80.0%) in the class-I obese group, with a mean follow-up duration of 2.52 years; and seventeen patients (70.8%) in the class-II obese group, with a mean follow-up duration of 2.34 years.

The preoperative patient-reported outcome and visual analog scale pain scores can be found in the Appendix and the postoperative patient-reported outcome and visual analog scale pain scores can be found in Table V. In the control group, the non-obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 63.41 to 83.81 points for the modified Harris hip score, 60.86 to 83.62 points for the Non-Arthritic Hip Score, 66.24 to 86.24 points for the Hip Outcome Score Activities of Daily Living,

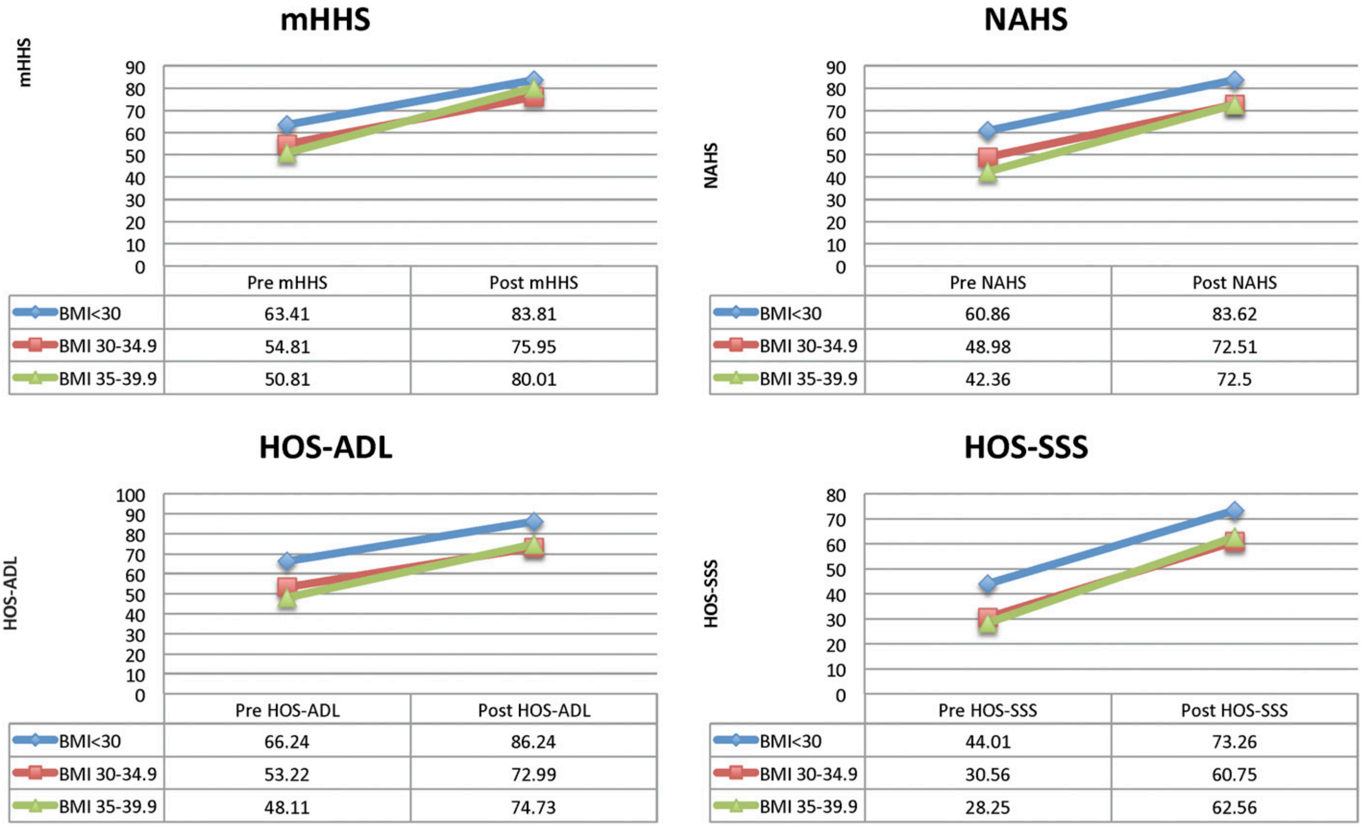

Fig. 1

Preoperative and two-year postoperative patient-reported outcome scores for patients with a BMI of <30 kg/m² (non-obese patients), those with a BMI of ≥30 to 34.9 kg/m² (class-I obese patients), and those with a BMI of ≥35 to 39.9 kg/m² (class-II obese patients): modified Harris hip score (mHHS) (**Fig. 1-A**), Non-Arthritic Hip Score (NAHS) (**Fig. 1-B**), Hip Outcome Score Activities of Daily Living (HOS-ADL) (**Fig. 1-C**), and Hip Outcome Score Sport-Specific Subscale (HOS-SSS) (**Fig. 1-D**).

and 44.01 to 73.26 points for the Hip Outcome Score Sport-Specific Subscale. In the class-I obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 54.81 to 75.95 points for the modified Harris hip score, 48.98 to 72.51 points for the Non-Arthritic Hip Score, 53.22 to 72.99 points for the Hip Outcome Score Activities of Daily Living, and 30.56 to 60.75 for the Hip Outcome Score Sport-Specific Subscale. In the class-II obese group, the score improvement from the preoperative assessment to the two-year follow-up visit was 50.81 to 80.01 points for the modified Harris hip score, 42.36 to 72.50 points for the Non-Arthritic Hip Score, 48.11 to 74.73 points for the Hip Outcome Score Activities of Daily Living, and 28.25 to 62.56 points for the Hip Outcome Score Sport-Specific Subscale. The non-obese group's baseline patient-reported outcome scores were all significantly higher ($p < 0.05$) than both the obese groups. For all three groups, all patient-reported outcome scores showed significant improvement ($p < 0.05$) postoperatively (Fig. 1). When comparing the change in patient-reported outcome scores for all groups, there was no significant difference ($p \geq 0.05$) between the control group and either one of the obese groups (see Appendix). All three groups showed a significant reduction ($p < 0.05$) in pain level as measured on the visual analog scale. There was no difference in the visual analog scale pain scores between the control group and either one of the obese groups (Fig. 2).

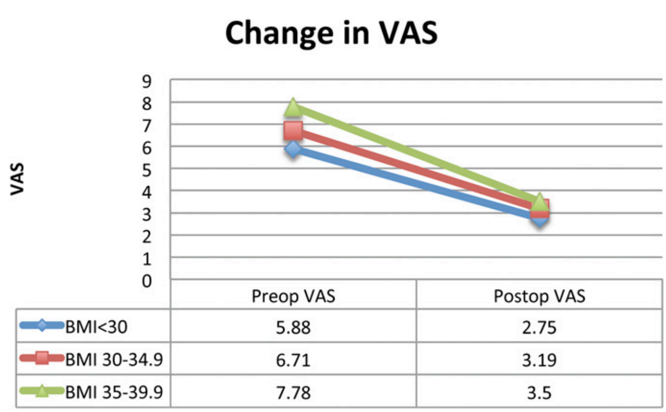

Fig. 2

The change in visual analog scale (VAS) pain scores preoperatively to a two-year postoperative follow-up for patients with a BMI of <30 kg/m² (non-obese patients), those with a BMI of ≥30 to 34.9 kg/m² (class-I obese patients), and those with a BMI of ≥35 to 39.9 kg/m² (class-II obese patients).

TABLE V Postoperative Patient-Reported Outcome and Visual Analog Scale Pain Scores

	Non-Obese Group* (N = 495)	Class-I Obese Group* (N = 75)	P Value†	Class-II Obese Group* (N = 17)	P Value‡
At three months postoperatively					
Modified Harris hip score	81.81	76.98	0.042	71.34	0.040
Hip Outcome Score Activities of Daily Living	84.24	81.06	0.182	74.44	0.062
Hip Outcome Score Sport-Specific Subscale	64.73	60.82	0.390	56.84	0.401
Non-Arthritic Hip Score	79.37	74.21	0.036	66.90	0.019
Visual analog scale	2.50	2.93	0.189	3.63	0.110
At one year postoperatively					
Modified Harris hip score	83.86	73.07	<0.001	75.65	0.147
Hip Outcome Score Activities of Daily Living	87.44	72.62	<0.001	77.68	0.086
Hip Outcome Score Sport-Specific Subscale	74.95	52.19	<0.001	59.47	0.095
Non-Arthritic Hip Score	83.02	69.30	<0.001	70.18	0.030
Visual analog scale	2.63	3.90	0.003	4.29	0.048
At the latest follow-up					
Modified Harris hip score	83.81	75.95	<0.001	80.01	0.337
Hip Outcome Score Activities of Daily Living	86.24	72.99	<0.001	74.73	0.005
Hip Outcome Score Sport-Specific Subscale	73.26	60.75	<0.001	62.56	0.135
Non-Arthritic Hip Score	83.62	72.51	<0.001	72.50	0.008
Visual analog scale	2.75	3.19	0.164	3.50	0.221

*The values are given in points. †The p values are compared between the non-obese group and the class-I obese group. ‡The p values are compared between the non-obese group and the class-II obese group.

The non-obese group improved by 3.13 points, the class-I obese group improved by 3.52 points, and the class-II obese group improved by 4.28 points. At the time of the latest follow-up, all three groups were pleased with their outcome (>7 of 10 points), with no difference between groups.

Clinical End Points

The clinical end point was set as the need for revision hip arthroscopy, total hip arthroplasty, or hip resurfacing. Of the patients who underwent revision hip arthroscopy, seven (1.2%) were in the non-obese group, seven (7.4%) were in the class-I obese group, and two (8.3%) were in the class-II obese group. Of the patients who underwent total hip arthroplasty, twenty-one (3.7%) were in the non-obese group, eight (8.5%) were in the class-I obese group, and one (4.2%) was in the class-II obese group. Of the patients who underwent hip resurfacing, four (0.7%) were in the non-obese group and had a conversion rate of 4.4% and one (1.1%) was in the class-I obese group and had a conversion rate of 9.6%. The indication for the majority of total hip arthroplasties was continued pain with progression of arthritis and joint-space narrowing on radiographs.

Complications

There were no complications in the class-II obese group. Heterotopic ossification was the most common complication, with six patients (1.1%) in the non-obese control group and one patient (1.1%) in the class-I obese group. Four patients (0.7%) in the non-obese group and one patient (1.1%) in the class-I obese group developed superficial wound infection postoperatively. In the non-obese group, four patients (0.7%) had sciatic nerve palsies and three patients (0.5%) had pudendal nerve palsies. No patients in either obese group had sciatic or pudendal nerve palsies. Two patients (0.4%) in the non-obese group and one patient (4.1%) in the class-II obese group presented with lateral femoral cutaneous nerve palsies. All nerve palsies resolved within six weeks postoperatively (see Appendix). Three patients (0.5%) in the non-obese group and one patient (1.1%) in the class-II obese group presented with a deep vein thrombosis; the patient in the class-II obese group also developed a pulmonary embolus.

Discussion

We present the results of primary hip arthroscopy comparing obese and non-obese patients. For all groups, primary hip arthroscopy has significant improvements in all patient-reported outcome scores with similar postoperative results. There was a higher percentage of labral repair and capsular plications in the non-obese group, with a lower conversion rate to total hip arthroplasty or hip resurfacing procedure. There was a lower rate of revision hip arthroscopy in the non-obese group compared with the two obese groups.

With the growing epidemic of obesity, there has been increased emphasis placed on the challenges of hip arthroscopy in this patient population. Although there is a relative paucity of literature with regard to obesity and hip arthroscopy, comparative literature in the knee and shoulder have shown mixed results. Harrison et al.[4] compared overweight and normal-weight females four to eleven years after arthroscopic debridement of the knee. They found that overweight women scored significantly lower on all domains of the SF-36 questionnaire with lower satisfaction rates. In our study, we found similar patient-reported outcome and satisfaction scores in the non-obese group and the class-I obese group at the time of the latest follow-up. This may be due to patient selection with all groups having preoperative Tönnis grades of 0 and 1 and a mean joint space of >3 mm.

Erdil et al.[20] evaluated more than 1000 patients undergoing knee arthroscopy with isolated partial meniscectomy based on BMI. Compared with the normal-weight group (those with a BMI of <26 kg/m^2), the overweight group (those with a BMI of ≥26 to 29.9 kg/m^2) and the obese group (those with a BMI of ≥30 kg/m^2) had significantly worse outcomes in the short term as measured by the International Knee Documentation Committee, the Lysholm Knee Scale, and the Oxford scoring system. Although we did not substratify our study population by a BMI of <26 kg/m^2, we did not find a significant difference in the magnitude of change in outcome scores at the two-year postoperative time point with the class-II obese patients (those with a BMI of ≥35 kg/m^2) compared with our non-obese controls.

To our knowledge, this is the first published study comparing the two-year outcomes of non-obese and obese patients. We present patient-reported outcomes, visual analog scale pain scores, and patient satisfaction scores for all three groups. With use of subcategories, we compared class-I and class-II obese groups with a non-obese patient population. Although we had a control group, one weakness of the study was that we did not perform a matched case-control series. Cohort populations can inherently have confounding variables that are difficult to control given the design of the study. We found that the non-obese group was significantly younger compared with both of the obese groups. This difference could also affect potential outcomes after hip arthroscopy and bias our results. We also had a relatively small study size in both obese groups, which may have lowered the power of our results. Additionally, we did not stratify on the basis of a patient BMI of <26 kg/m^2 or ≥40 kg/m^2, which could have provided more insight of outcomes based on BMI classification.

Our study demonstrated that obese patients started with lower absolute scores preoperatively and ended with lower overall absolute postoperative scores. However, obese patients showed substantial benefits from hip arthroscopy and demonstrated a degree of improvement similar to that of the non-obese control group. Although patient and physician expectations may be adjusted accordingly in the obese population, these results support the use of hip arthroscopy in the obese patient population.

Appendix

eA Tables showing inclusion and exclusion criteria, Tönnis grade, preoperative patient-reported outcome and visual analog scale pain scores, the change in preoperative to postoperative patient-reported outcome and visual analog scale pain scores, and postoperative complications are available with the online version of this article as a data supplement at jbjs.org. ■

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