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Hip Arthroscopy for Labral Tears in Workers' Compensation

A Matched-Pair Controlled Study

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Background: Workers' compensation (WC) status has been related to clinical outcomes; however, no comparative studies have been performed to assess 2-year outcomes between hip arthroscopy patients based on WC status.

Purpose: To evaluate 2-year outcomes of patients receiving WC who underwent hip arthroscopy for labral tears and to compare outcomes with those of a matched control group not receiving WC.

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

Methods: During the study period between June 2008 and August 2010, data were collected on all patients treated with hip arthroscopy. Inclusion criteria for the study group were diagnosis of labral tear and WC status. All patients were assessed pre- and postoperatively with 4 patient-reported outcome (PRO) measures: the modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score–Activities of Daily Living (HOS-ADL), and Hip Outcome Score–Sport-Specific Subscales (HOS-SSS). Pain was estimated on the visual analog scale (VAS), and satisfaction was measured on a scale from 0 to 10. A matched-pair group of patients not associated with WC was selected in a 1:1 ratio according to age within 3 years, sex, surgical procedures, and radiographic findings.

Results: Twenty-one hips were included in each group. Patients with WC status had significantly lower preoperative PRO scores for all measures ($P < .001$). However, there was no significant difference between VAS pain scores between the groups. Of the WC patients, 86% returned to work at a median 82 days postoperatively. For the WC group, the score improvement from preoperative to 2-year follow-up was 46 to 67.7 for mHHS, 39.3 to 66 for NAHS, 39.7 to 69.5 for HOS-ADL, and 15.3 to 49.8 for HOS-SSS. For the control group, the score improvement from preoperative to 2-year follow-up was 67.9 to 85.8 for mHHS, 62.6 to 84.4 for NAHS, 69.8 to 86.9 for HOS-ADL, and 41.9 to 73.8 for HOS-SSS. Both groups demonstrated statistically significant postoperative improvement in all scores, and the average amount of change of preoperative to postoperative scores between the 2 groups was only significantly different for the HOS-ADL in the control group ($P = .043$). However, the WC group demonstrated greater improvement in aggregate scores in the HOS-ADL. Pain scores decreased from 7 to 3.9 in the WC group and 5.8 to 3.2 in the control group and were not significantly different between the groups. Patient satisfaction was 6.8 for the WC group and 7.7 for the control group, with no significant difference between groups.

Conclusion: Our study demonstrated that WC patients had significantly lower baseline PRO scores when compared with a matched-pair control group. However, both groups demonstrated statistically significant postoperative improvement in all scores. Patients with WC status started and ended with lower absolute scores but benefited from arthroscopic intervention for hip injuries. While patient and physician expectations may be adjusted accordingly, these results may reflect favorably on the use of hip arthroscopy for labral tears in the WC population.

Keywords: hip; arthroscopy; workers' compensation; labral tears

Workers' compensation (WC), a category of medical compensation status, is often associated with inferior outcomes after clinical or surgical intervention. In a meta-analysis conducted by Harris et al,[5] 95% of 129 studies that were reviewed using dichotomous outcomes scores demonstrated a relationship between inferior outcomes and compensation status. On the basis of the analysis, the authors concluded that WC patients are 3 times more likely to have an unsatisfactory outcome compared with non-WC patients. Several studies examining knee and shoulder outcomes demonstrated poorer outcomes for patients receiving WC benefits compared with non-WC patients.[1,9,12] Studies addressing the WC population in

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knee and joint problems are common, but literature addressing the WC population with hip pain requiring surgical intervention is lacking.

One of the challenges of studying the relationship between WC status and outcomes is the lack of prospective clinical trials, necessitating analysis based on observational data.[5] Harris et al[5] recommended research focusing on prospective studies using matched control groups. Additional research may yield information to help improve outcomes, facilitate appropriate expectations, increase productivity, and lessen economic burdens of work-related injuries.

Hip arthroscopy is shown to be an effective procedure for treatment of pathologic conditions in and around the hip joint.[2,9,10] Surgical technique and patient selection are essential factors to consider when assessing outcomes.[6,10] Because patients receiving WC often report inferior clinical results, research on this population receiving hip arthroscopy is important to help improve outcomes and establish appropriate expectations. Previous research on hip arthroscopy patients receiving WC has been inconsistent or limited by small sample sizes.[2,4,6,9] No comparative studies assessing 2-year outcomes of patients receiving WC who underwent hip arthroscopy for labral tears have been performed.

The purpose of this matched-pair controlled study was to compare the 2-year outcomes of 2 groups of patients undergoing hip arthroscopy for labral tears, 1 group receiving WC and the other serving as a control group. Our hypothesis was patients receiving WC would have inferior outcomes compared with the non-WC control group.

MATERIALS AND METHODS

At our center, clinical and outcomes data are collected on all patients undergoing arthroscopic surgery of the hip. The study period was between June 2008 and August 2010. Patient-reported outcome (PRO) scores used included the modified Harris Hip Score (mHHS), the Non-Arthritic Hip Score (NAHS),[3] the Hip Outcome Score–Activities of Daily Living (HOS-ADL), and the Hip Outcome Score–Sport-Specific Subscale (HOS-SSS) and were collected preoperatively and at 3-month, 1-year, and 2-year follow-ups. All 4 questionnaires are used, as it has been reported that there is no conclusive evidence for the use of a single PRO questionnaire for patients undergoing hip arthroscopy.[8,11] Pain was estimated on a visual analog scale (VAS) from 0 to 10 (10 being the worst), and satisfaction was measured with the question "How satisfied are you with your surgery results? (1 = not at all, 10 = the best it could be)." Our institutional review board approved this study.

The inclusion criteria for this study were diagnosis of labral tear, WC status, minimum 2-year follow-up, and treatment with arthroscopic surgery. Exclusion criteria were previous hip conditions such as Legg-Calve-Perthes disease or avascular necrosis. The matched-pair control group was selected on a 1:1 ratio based on age within 3 years, sex, clinical diagnoses, surgical procedures, and radiographic findings. Radiographs were scrutinized, and patients were matched by Tonnis grade 0 or 1, crossover percentage less than 20 or greater than 20, positive or negative for profunda or protrusion, positive or negative for cam-type morphology, and positive or negative for acetabular retroversion.

Statistical Methods

The 2-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 PRO scores (change from preoperative to postoperative score) between the WC group and the matched-pair control group. Mean differences and ± 1 standard error were calculated. Adjustment for preoperative differences between the 2 groups was explored using an analysis of covariance (ANCOVA) model. A P value of $<.05$ was considered significant. A post hoc power analysis demonstrated a power of .89. Statistical analysis was done with Microsoft Office Excel 2007 (Microsoft Corp, Redmond, Washington) and IBM SPSS 12.0 for Windows (SPSS Inc, Chicago, Illinois).

RESULTS

Patient Population

Twenty-one hips from 20 patients met the inclusion criteria for the WC group. The majority of the patients were male (86%), with only 3 females. The average age was 39 years (range, 24-55 years). United States Department of Labor job classification and mechanism of injury for the WC group are presented in Table 1. Nine (42%) of the patients had heavy job classifications, 4 (20%) were medium, and 8 (38%) were considered light, with no patients falling into the very heavy or sedentary categories, based on author consensus and available information. The average number of days from injury to time of surgical intervention was 548 days (range, 75-1729 days). All WC patients received surgical intervention for labral tears and intra-articular abnormalities such as femoracetabular impingement (FAI). Table 2 describes the surgical procedures performed for the WC group.

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TABLE 1
Descriptive Characteristics of Workers' Compensation Group

Age, y	Sex	US Department of Labor Job Classification	Mechanism of Injury
24	M	Heavy	Moving object and twisted
27	F	Light	Chair pulled out from under her
27	F	Light	Chair pulled out from under her
28	M	Heavy	Lifting heavy object
30	M	Heavy	Felt pull in hip while running
30	F	Medium	Lifting a heavy patient (450 lb)
34	M	Light	Slipped while carrying heavy object
35	M	Heavy	Twisting injury/slipped and fell
36	M	Light	Breaking up a fight
36	M	Heavy	Slipped on ice
37	M	Medium	During pursuit slipped and fell
38	M	Heavy	Pulling on a large steel beam
40	M	Heavy	Hit by a falling ladder causing him to fall
42	M	Heavy	Twisted while carrying metal poles
46	M	Light	Fell off the back of a truck
46	M	Light	Fall
51	M	Medium	Slip, then a fall
52	M	Medium	Twisting injury while carrying heavy objects; physical therapy aggravated injury
54	M	Light	Missed a step getting out of truck
55	M	Heavy	Moving hose
55	M	Light	Fell between dock and trailer

TABLE 2
Hip Procedures Performed for Workers' Compensation (WC) and Control Group[a]

Hip Procedure	Prevalence: WC Group	Prevalence: Control Group
Arthroscopic osteoplasty (cam-type FAI)	95	100
Acetabuloplasty (pincer-type FAI)	71	76
Chondroplasty	62	86
Labral repair	52	48
Ligamentum teres debridement	52	76
Labral debridement	48	81
Removal of loose body	24	9
Synovectomy	24	67
Microfracture	19	24
Iliopsoas release	5	0
Capsular plication	5	14
Capsular release	5	24
Debridement trochanteric bursitis	5	5
Excision of bone cyst of acetabulum	5	5

[a]Values are percentages. FAI, femoracetabular impingement.

TABLE 3
Average Preoperative Patient-Reported Outcome Scores[a]

	Workers' Compensation	Control Group	*P* Value
mHHS	46.0	67.9	<.001
NAHS	39.3	62.6	<.001
HOS-ADL	39.7	69.8	<.001
HOS-SSS	15.3	41.9	<.001

[a]HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS–Sport-Specific Subscales; mHHS, Modified Harris Hip Score; NAHS, Non-Arthritic Hip Score.

A matched-pair control group was established in a 1:1 ratio based on sex, age within 3 years, diagnoses, and procedural and radiographic parameters. Surgical procedures performed in the control group are presented in Table 2. However, groups differed in preoperative scores, with the WC group having lower baseline PRO scores than the control group ($P < .001$). Mean preoperative scores for both groups are presented in Table 3. However, there was no significant difference in VAS pain scores between the groups. At the 3-month follow-up point, 86% of the WC group and 90% of the control group provided the 4 PRO scores, which demonstrated statistically significant improvement in both groups ($P < .001$). For pain and satisfaction, only 50% of both groups reported scores, so significance could not truly be evaluated. At the 1-year mark, with similar percentages from both groups reporting, the WC group again demonstrated statistically significant improvement ($P < .05$) for all PROs and the non-WC group reported a higher level of improvement at the 1-year mark ($P < .001$). There were no statistical differences between the groups for pain and satisfaction at the 1-year mark when compared with the WC group.

For the WC group, the score improvement from preoperative to 2-year follow-up was 46 to 67.7 for mHHS, 39.3 to 66 for NAHS, 39.7 to 69.5 for HOS-ADL, and 15.3 to 49.8 for HOS-SSS. For the control group, the score improvement from preoperative to 2-year follow-up was 67.9 to 85.8 for mHHS, 62.6 to 84.4 for NAHS, 69.8 to 86.9 for HOS-ADL, and 41.9 to 73.8 for HOS-SSS. All improvements in both groups were statistically significant ($P < .001$) (Table 4).

TABLE 4
Average Preoperative and Postoperative Patient-Reported Outcome Scores[a]

	Average Preoperative Score	Average Postoperative 2-Year Follow-up Score	*P* Value
Workers' Compensation group			
mHHS	46.0	67.7	<.001
NAHS	39.3	66	<.001
HOS-ADL	39.7	69.5	<.001
HOS-SSS	15.3	49.8	<.001
Non–workers' compensation group			
mHHS	67.9	85.8	<.001
NAHS	62.6	84.4	<.001
HOS-ADL	69.8	86.9	<.001
HOS-SSS	41.9	73.8	<.001

[a]mHHS, Modified Harris Hip Score; NAHS, Non-Arthritic Hip Score; HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Sport-Specific Subscales.

TABLE 5
Unadjusted and Adjusted Posttreatment Means and Group Differences[a]

			Preoperative		Unadjusted 2 Years Postoperative		Difference Adjustment[b]			
Outcome	Group	No. of Subjects	Mean	SE	Mean	SE	Mean	SE	95% CI for Difference	*P* Value
NAHS	Non-WC	21	62.6	3.1	84.4	2.5	21.8	3.9		.4080
	WC	21	39.3	2.6	66.0	3.9	26.7	4.3		
	Difference[c]		23.3	4.0	18.5	4.7	–4.8	5.8	–16.5 to 6.9	
mHHS	Non-WC	21	67.9	3.4	85.8	2.41	17.9	4.53		.5344
	WC	21	46.0	2.5	67.7	4.34	21.7	4.14		
	Difference[c]		21.9	4.3	18.1	5.0	–3.8	6.14	–16.2 to 8.5	
HOS-ADL	Non-WC	21	69.8	2.9	86.9	2.57	17.1	4.07		**.0429**
	WC	21	39.7	3.2	69.5	4.70	29.8	4.49		
	Difference[c]		30.0	4.4	17.4	5.4	–12.7	6.06	–24.9 to −0.4	
HOS-SSS	Non-WC	21	41.9	4.7	73.8	4.90	31.9	6.43		.6416
	WC	20	15.3	2.8	49.8	6.16	36.0	5.85		
	Difference[c]		26.6	5.5	24.0	7.9	–4.1	8.72	–21.7 to 13.5	
Pain	Non-WC	19	5.79	0.44	3.19	0.52	–2.58	0.83		.5653
	WC	20	7.15	0.39	3.86	0.45	–3.15	0.55		
	Difference[c]		–1.36	0.6	–0.67	0.7	0.57	0.98	–1.4 to 2.6	

[a]CI, confidence interval; HOS-ADL, Hip Outcome Score–Activities of Daily Living; HOS-SSS, Hip Outcome Score–Sport-Specific Subscales; mHHS, Modified Harris Hip Score; NAHS, Non-Arthritic Hip Score; SE, standard error; WC, workers' compensation. Bolded value indicates significance.
[b]Difference adjustment = 2 years postoperative – preoperative.
[c]Difference = non-WC – WC.

An independent *t* test was used to compare the average amount of change in PRO scores between the 2 groups, and only the HOS-ADL demonstrated statistical significance ($P = .043$) for the non-WC group. However, the WC group demonstrated greater improvement in aggregate scores for the HOS-ADL. Average preoperative and postoperative scores are presented in Figure 1; mean differences, ±1 standard error, and standard deviations are presented in Table 5. Pain scores decreased from 7.2 to 3.9 in the WC and from 5.8 to 3.2 in the control groups, with no statistical difference found between the 2 groups. Patient satisfaction was 6.8 for the WC group and 7.7 for the control group, with no significant difference between groups.

Two of the 20 WC patients experienced a complication; both involved temporary pudendal neurapraxia that resolved without further intervention. Two patients required revision surgery. The first patient required revision surgery 3 years later for persistent pain. Surgical findings included Seldes type 2, labral tear, adhesions to the capsule, partial tear of the ligamentum teres, and thickening of the capsule, consistent with stiffness. The second patient required revision surgery 13 months postoperatively because of persistent anterior hip pain and limited range of motion. Operative findings included adhesive capsulitis and ligamentum teres tear. The patient underwent lysis of adhesions, ligamentum teres debridement, and capsular release.

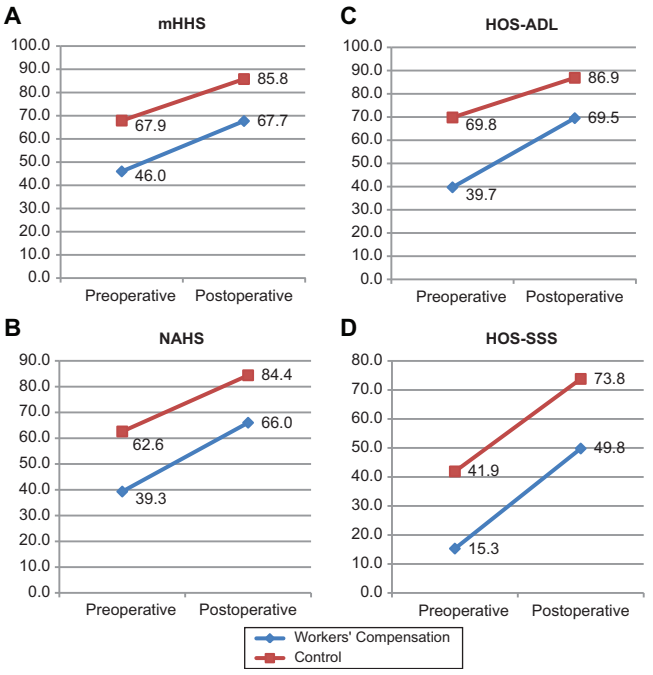

Figure 1. Average preoperative and postoperative patient-reported outcome scores of workers' compensation (WC) and non-WC groups. A. Modified Harris Hip Score (mHHS). B. Non-Arthritic Hip Score (NAHS). C. Hip Outcome Score–Activities of Daily Living (HOS-ADL). D. Hip Outcome Score–Sport-Specific Subscale (HOS-SSS).

In the control group, 1 patient required revision surgery 1.5 years after the initial procedure. The patient had reproducible pain, positive impingement sign, and failure to improve with nonoperative therapy. A large 3-cm piece of heterotopic ossification formed a loose body in the anterior capsule requiring removal. No surgical complications were reported in the control group.

The average number of days for patients' first return to work was 122 days, and the median number of days was 82 (range, 12-424 days). At last point of follow-up, 18 (86%) patients were able to return to work. Six (33%) returned to modified duty and 12 (67%) returned with no restrictions, at an average of 219 days (range, 15-442 days) from surgical intervention to final unrestricted work status. Of the 3 patients unable to return to work, 1 patient was referred to a spine specialist for further consultation; 1 was unable to return because of non-hip-related injuries; and the third was unable to return to work due to the heavy physical nature of the job and was declared to be at maximum medical improvement.

Since preoperative baseline means were not the same between the groups, in addition to the preoperative to postoperative change, results from the ANCOVA model were examined. However, the preoperative to postoperative correlations were weak, ranging from $r = 0.032$ to $r = 0.371$, implying that on the level of individuals, the postoperative value was not strongly dependent on the preoperative value, a finding inconsistent with the ANCOVA approach. Therefore, the preoperative to postoperative change reported above is a less biased assessment than results based on an ANCOVA adjustment. For this reason the ANCOVA results are not shown.

DISCUSSION

To our knowledge, this is the first study assessing 2-year outcomes of hip arthroscopy for labral tears that compares patients with WC status and those without WC. The results of our study offer new insight into a population for whom research has demonstrated mixed or inferior results after clinical or surgical intervention. Our results show that WC patients experience significantly improved PRO scores after intervention. Furthermore, the average change in preoperative to postoperative scores was comparable in patients without WC status for 3 of the 4 PROs used. However, this category of patients reported significantly lower PRO scores preoperatively and had correspondingly lower scores at 2 years. Furthermore, 86% of WC patients were able to return to work, and 67% of those returned to work without restrictions. These results indicate that WC patients can benefit from arthroscopic intervention for labral tears of the hip, have a high rate of return to work, and show comparable response to intervention as patients not associated with WC.

Previous studies of other orthopaedic surgeries have suggested inferior outcomes in WC patients.[1,5,9,12] In a study conducted by Lee et al,[7] WC status was identified as 1 of 5 predictors contributing to longer than typical recovery time in hip arthroscopy for labral tears. However, in contrast to our study, Lee et al did not use a formal PRO tool to assess patient outcomes but rather based their findings on univariate analysis and the relationship of 13 variables to longer than typical recovery time.[7] Therefore, the Lee et al study does not establish whether WC status affects the opportunity to surgically improve pain and function with hip arthroscopy. Kamath et al[6] also assessed the category of secondary gain, which includes WC, related to outcomes in patients undergoing arthroscopic treatment for labral tears. For the mHHS, no patients in the secondary gain group reported a good or excellent outcome postoperatively. The authors reported that patients with a secondary gain categorization were less likely to return to prior activity level,[6] although the results were not statistically significant.

Potter et al[9] hypothesized that military personnel undergoing military disability evaluation (MEB), the military category comparable with WC, would have significantly lower outcome scores after receiving arthroscopic treatment for labral tears. The authors found that patients with disability status reported significantly lower scores on the mHHS and the Short Form–36. However, a limitation in the comparability of this study to ours is whether MEB is truly equivalent to WC status. Additionally, preoperative data were not available for the MEB cohort. Thus, the mean change after intervention cannot be calculated, leading us to speculate whether the MEB group may have had more severe symptoms preoperatively. This theory is based on our results; the MEB

cohort, like our WC cohort, may have demonstrated lower baseline scores and similar magnitude of improvement to the control group.

Byrd and Jones[2] assessed WC as a variable for patients undergoing hip arthroscopy and found that these patients did better than the non-WC group, but results were not statistically significant and the sample size was limited (4 with WC and 4 with pending litigation). The authors concluded that WC was not a contraindication and that successful outcomes through arthroscopic intervention could be achieved.

The biggest strength of the present study is the matched-pair control design. To our knowledge, this is the first study to directly compare a WC group and a control group in assessing 2-year outcomes of hip arthroscopy for labral tears. This study used 4 different PRO tools, addressing the psychometric evidence that no single PRO is adequate for assessing outcomes in hip preservation surgery.[8,11] The comparisons of pre- and postoperative PRO measures revealed significantly lower preoperative scores in the WC group, a finding that has not been reported previously in hip preservation literature. The capture of preoperative data provides the ability to demonstrate similar magnitudes of improvement between the 2 groups.

Several limitations may affect this study. Because of the sample size, the cohorts could be matched by a limited number of variables, and other confounding variables could have influenced the results of the study. Furthermore, our study reflects the practice and results from 1 state. Workers' compensation laws and regulations may differ between states and may affect outcomes. Additionally, a larger sample size might provide further insight into a challenging health care issue.

CONCLUSION

Our study demonstrated that patients with WC status started and ended with lower absolute scores. However, WC patients showed significant benefit from hip arthroscopy for labral tears and demonstrated a similar degree of improvement as the control group. Although patient and physician expectations may be adjusted accordingly in the WC population, these results support the use of hip arthroscopy for labral tears in the WC population.

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