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Correlation of Short Form–36 and Disability Status With Outcomes of Arthroscopic Acetabular Labral Debridement

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Background: Arthroscopic debridement is the standard of care for the treatment of acetabular labral tears. The Short Form–36 has not been used to measure hip arthroscopy outcomes, and the impact of disability status on hip arthroscopy outcomes has not been reported.

Hypothesis: Short Form–36 subscale scores will demonstrate good correlation with the modified Harris hip score, but patients undergoing disability evaluation will have significantly worse outcome scores.

Study Design: Case series; Level of evidence, 4.

Methods: The records of active-duty soldiers who underwent hip arthroscopy at the authors' institution were retrospectively reviewed. Forty consecutive patients who underwent hip arthroscopy for the primary indication of labral tear formed the basis of the study group. Patients completed the modified Harris hip score, the Short Form–36 general health survey, and a subjective overall satisfaction questionnaire.

Results: Thirty-three patients, with a mean age of 34.6 years, were available for follow-up at a mean of 25.7 months postoperatively. Fourteen (43%) patients were undergoing medical evaluation boards (military equivalent of workers' compensation or disability claim). Pearson correlation coefficients for comparing the Short Form–36 Bodily Pain, Physical Function, and Physical Component subscale scores to the modified Harris hip score were 0.73, 0.71, and 0.85, respectively ($P < .001$). The mean modified Harris hip score was significantly lower in patients on disability status than in those who were not (92.4 vs 61.1; $P < .0001$). The Short Form–36 subscale scores were significantly lower in disability patients ($P < .02$). Patient-reported satisfaction rates (70% overall) were 50% for those undergoing disability evaluations and 84% for those who were not ($P < .04$). There was no significant difference in outcomes based on patient age, surgically proven chondromalacia, or gender for military evaluation board status.

Conclusion: The Short Form–36 demonstrated good correlation with the modified Harris hip score for measuring outcomes after arthroscopic partial limbectomy. Arthroscopic debridement yielded a high percentage of good results when patients undergoing disability evaluations were excluded. Disability status may be a negative predictor of success after hip arthroscopy.

Keywords: hip arthroscopy; acetabular labral tear; health assessment; disability compensation

Hip arthroscopy is now a well-established procedure used with increasing popularity in the treatment of a variety of hip disorders. Hip arthroscopy was first described by Burman[5] in 1931, but it was not until almost 50 years later that the diagnostic and therapeutic clinical uses of hip arthroscopy were established.[6,13,14,32,33] The indications for this surgical technique have increased dramatically in the past 3 decades. Currently, hip arthroscopy is used for the diagnosis and treatment of painful conditions of the hip, often associated with mechanical symptoms, which fail to respond to adequate nonoperative therapy. These disorders include labral tears, loose bodies, synovitis, chondral defects, septic arthritis, and degenerative conditions of the

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hip.[2,7,10,11,20,24,29] The most favorable outcomes after hip arthroscopy have been observed, however, for the treatment of labral tears and loose bodies, particularly in younger patients with acute onset of symptoms and little associated chondral damage.[7,10,11,24,29,31] Poorer outcomes have been associated with the treatment of more chronic and degenerative conditions, such as osteoarthritis and osteonecrosis of the femoral head.[16,17,29]

The outcomes movement resulted in a shift in outcomes assessment from traditional, objective physician-derived data to subjective patient measures. Recently, there has been a greater focus on general patient health measures, in addition to disease- and joint-specific outcome measures, and the use of generic health measures such as the Short Form–36 (SF-36) has been advocated.[4,22,35] In accordance with this shift, we have broadened our clinical outcomes assessments to include measures of general health and well-being. This study is the first to apply a general health outcome measure to evaluate results after the arthroscopic debridement of acetabular labral tears.

In addition, patients on workers' compensation or patients involved in litigation frequently have been shown to have worse outcomes after a wide variety of elective surgeries than do patients not involved in medicolegal actions.[1,3,8,15,23,27,28,36] Only 2 previous hip arthroscopy studies have included workers' compensation patients in their results.[7,10] Surprisingly, these authors reported that patients on workers' compensation fared as well as or better than patients not receiving workers' compensation. These findings are in contradiction to our own anecdotal experience.

In the military, the correlate to workers' compensation is medical discharge and disability compensation. Soldiers with ailments and injuries that prohibit them from meeting the physical standards for active duty, as outlined in US Army Regulations 40-501, are medically discharged. During the review process that leads to this discharge, called a medical evaluation board (MEB), the severity and cause of a patient's condition are reviewed, and disability compensations are awarded accordingly. Therefore, soldiers on MEB status, like their civilian counterparts under evaluation for workers' compensation, have similar conflicting incentives when undergoing elective surgery for conditions that have led or will lead to their final disability rating and level of financial compensation. Previous peer-reviewed studies using a military health care model have equated MEB status with civilian workers' compensation and disability conflicts of interest.[19,36]

It has been our observation that patients on MEB status undergoing elective arthroscopy for painful conditions of the hip have worse outcomes than do patients not on MEB status. To date, no one has empirically tested this observation. Therefore, we performed a retrospective cohort study seeking to discover whether this observation was accurate. We intentionally selected a cohort of young, active patients undergoing hip arthroscopy for the primary indication of acetabular labral tear, as patients with this indication have experienced the highest success rate at our institution and in previously reported studies.[7,10,11,24,29]

This study was designed to test our null hypothesis that there is no difference between patients who were and were not on MEB status when undergoing arthroscopic debridement of acetabular labral tears. Furthermore, we hypothesized that there was a strong direct correlation between general health outcomes as assessed by the SF-36 and joint-specific outcomes as assessed by the modified Harris hip score (MHHS). Finally, we wanted to report our experience and mean 2-year outcomes for arthroscopic partial limbectomy in a relatively young population of active-duty soldiers.

MATERIALS AND METHODS

After Institutional Review Board approval was obtained, we performed a retrospective cohort study comparing the results of hip arthroscopy for the debridement of acetabular labral tears between January 1998 and January 2003 in patients undergoing MEB versus those not undergoing MEB. All surgical procedures were performed by the same sports fellowship–trained orthopaedic surgeon experienced in hip arthroscopy. Each arthroscopy was performed on a fracture table with joint distraction in the supine position as described by Byrd.[6] No revision arthroscopies were included, and hip arthroscopy was the first hip surgery performed to date for each patient.

The medical records, radiographs, MRI scans, magnetic resonance arthrograms, as well as operative reports and arthroscopic pictures, were reviewed for all patients. Patients were contacted by telephone, by e-mail, or during a return clinic visit, and 3 outcome measure assessments were performed. Each patient completed the MHHS joint-specific assessment questionnaire and the SF-36 general health assessment questionnaire. Finally, patients responded to a question regarding their overall satisfaction with the results of the procedure (very satisfied, somewhat satisfied, neither satisfied nor dissatisfied, somewhat dissatisfied, and very dissatisfied).

The MHHS was modified in the same manner as described by Byrd and Jones,[7] with exclusion of the 9 points for deformity and then multiplication of the summed score by a correction factor of 1.1 to allow for a maximum score of 100 (actually, 100.1). The MHHS was selected because it has been used previously to assess outcomes after partial limbectomy; however, it should be noted that there are currently no validated measures for hip arthroscopy outcomes. The SF-36 is a composite of 8 subscales, each assessing a different facet of overall general health. The 2 subscales most frequently used to evaluate outcomes in orthopaedic surgery studies are the Bodily Pain (BP) and Physical Function (PF) subscales. The BP subscale assesses the severity of pain typically experienced by the patient, whereas the PF subscale assesses the patient's ability to perform physical activities, including vigorous exercise. In addition, we have reported on the Mental Component Summary (MCS) and Physical Component Summary (PCS) subscales. These scales are formed by systematically combining the results of subscales that reflect a patient's mental and physical health

to allow for a general assessment of overall physical and mental health. All SF-36 subscale scores have been calculated using a norm-based scoring system, in which the scores of this study population are compared with the scores of average "healthy" US citizens. The data for average "healthy" US citizens have been collected as part of the Medical Outcomes Study.[34] Under norm-based scoring, the scores for each of the 8 subscales and the 2 component summary scales are normalized, such that the mean value of each scale is 50 with an SD of 10. Therefore, patients with norm-based scores less than 50 are not as healthy as the average US citizen, whereas those who score above 50 are healthier.

Results for each group are reported and analyzed, as well as the combined results for the entire cohort. Separate subgroup analysis was performed for age (older or younger than 30 years), the presence or absence of chondromalacia as determined intraoperatively, and gender. Statistical analysis was performed using the SPSS software package (SPSS Inc, Chicago, Ill). Means and 95% confidence intervals have been calculated for relevant variables. The Student *t* test was used to analyze the differences between groups for a significance level of .05. The Pearson correlation coefficient (*r*) was calculated to assess the correlation between SF-36 subscales and the MHHS. Univariate analysis of variance with a significance level of .05 was performed to assess the relationships between patient factors (MEB status, gender, age, and cartilage status) and the MHHS.

RESULTS

During the study period, 40 active-duty soldiers underwent hip arthroscopy for the primary indication of acetabular labral tears. Thirty-three (83%) patients were available for appropriate clinical follow-up to allow outcomes assessment at a mean of 25.7 months (range, 13-55 months) postoperatively. These 33 patients, with a mean age of 34.6 years (range, 21-56 years), formed our study sample. There were 19 (58%) women and 14 (42%) men. All patients had chronic hip pain, with a mean duration of symptoms of 29.9 months (range, 6-70 months), that had failed to respond to at least 6 months of physician-directed nonoperative therapy, including activity modification, anti-inflammatory medications, and physical therapy. Nineteen patients (58%) were not undergoing MEB evaluation at the time of their hip arthroscopy; they constitute group 1. The remaining 14 patients (42%) were involved in the MEB process at the time of their surgery and compose group 2. Seven patients (3 women, 4 men) were lost to follow-up because of prolonged overseas deployment (1 patient), inability to obtain accurate contact information after completion of military service (4 patients), or medical separation from the military (2 patients). These patients were not significantly different from those available for follow-up with regard to age, gender, or proportion of patients on MEB status (all $P > .40$).

Diagnostic confirmation and debridement of an acetabular labral tear were the primary indications in all hip arthroscopies included in the study. The mean preoperative duration of symptoms and clinical follow-up were similar between groups 1 and 2 (Table 1). Group 1 tended to be older (mean age, 37.3 vs 32.9 years), and there was a substantial majority of female patients in group 2 (11/14, 79%). Twenty-two of the 33 patients (67%: 13 in group 1 and 9 in group 2) complained of mechanical symptoms, including clicking, popping, giving way, and/or locking preoperatively. Ten (45%) of these patients reported complete resolution of their mechanical symptoms postoperatively, with 12 patients reporting persistent but generally decreased (11/12) mechanical symptoms. No patient developed new mechanical symptoms postoperatively. With the numbers available (power < .80), there was no statistically significant difference or trend noted in the 3 outcome measures based on preoperative presence or postoperative persistence or resolution of mechanical symptoms (all $P > .20$).

TABLE 1
Patient Demographics[a]

	Group 1: Nondisability	Group 2: Medical Evaluation Board Disability	Total
Total patients	19	14	33
Mean age, y	37.3 (23-56)	32.9 (21-56)	34.6 (21-56)
Duration of symptoms, mo	27.7 (6-65)	32.4 (10-70)	29.9 (6-70)
Follow-up, mo	28.1 (13-55)	22.4 (14-38)	25.0 (10-55)
Women/men	8/11	11/3	19/14

[a]Numbers in parentheses are ranges.

Eleven patients (33%) reported a history of an acute athletic injury associated with their symptoms; 2 (6%) patients were injured in motor vehicle accidents and sustained posterior hip dislocations treated nonoperatively. Twenty patients (61%) could not recall a specific injury relating to the onset of symptoms. With the numbers available, the mechanism of injury did not have a significant impact on patient outcomes. Eight patients (24%) had evidence of mild (5 patients) or moderate (3 patients) osteoarthritis on their preoperative plain films.[17] No patients had severe osteoarthritis noted on plain film. Only 1 patient had evidence of developmental dysplasia of the hip (DDH), as defined by Delaunay et al[9] (center-edge angle < 20°).

At operation, there were 34 labral tears in 33 hips, with 31 (91%) anterior or anterosuperior (Figure 1) labral tears noted versus 3 (9%) posterior labral tears. One patient had separate anterior and posterior labral tears, and 2 of the 3 patients with posterior tears had sustained traumatic posterior hip dislocations. There was no difference between groups 1 and 2 with regard to the location of labral tears. Seven of 19 (37%) patients in group 1 versus 3 of 14 (21%) patients in group 2 had areas of chondromalacia that were greater than or equal to grade III according to the Outerbridge classification.[30]

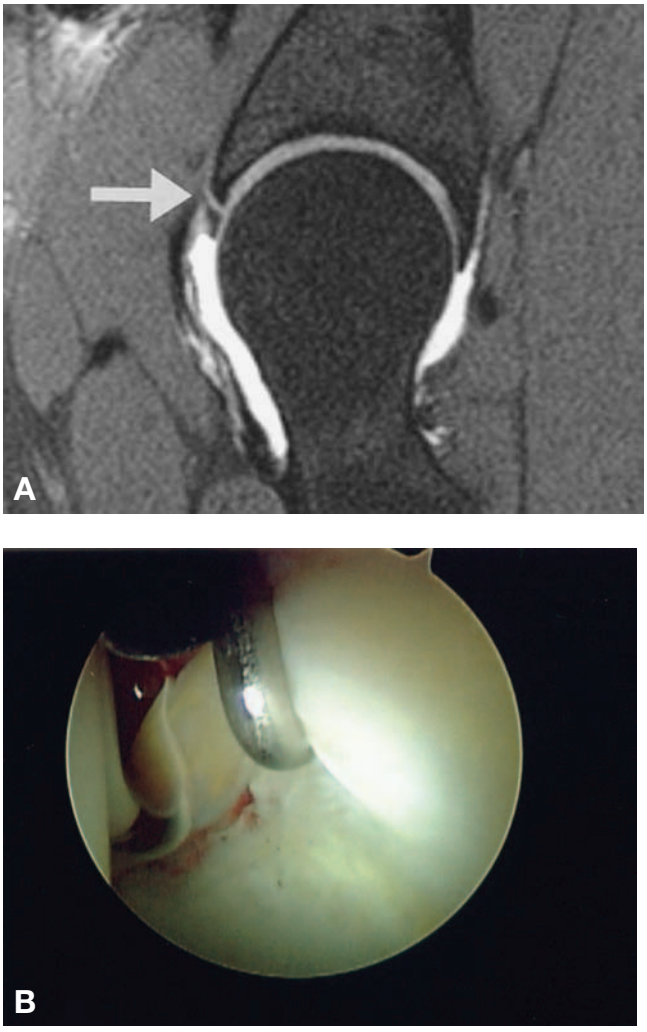

Figure 1. A, magnetic resonance arthrography image demonstrating a horizontal anterosuperior acetabular labral tear of the left hip. B, corresponding arthroscopic photograph of the same labral tear before surgical debridement. The probe was inserted through the anterior portal, and the arthroscope was in the anterolateral paratrochanteric portal.

Complete MHHS and patient satisfaction results were available for all 33 patients. Two patients did not complete the SF-36, so there were 31 groups of scores available for SF-36 data analysis. Correlation analysis revealed good to excellent positive correlation between the MHHS and the SF-36 PF subscale ($r = 0.71$), the BP subscale ($r = 0.73$), and the PCS subscale ($r = 0.85$; $P < .05$). The MCS subscale demonstrated fair to poor correlation ($r = 0.50$).

Overall, only 13 (39%) patients had good or excellent results as assessed by the MHHS (MHHS > 80); however, 70% of patients were very or somewhat satisfied with the results of their procedure. In addition, when only non–disability compensation patients (group 1) were examined, 68% of patients had good or excellent results on the MHHS, and 84% of patients were very or somewhat satisfied with the results of their procedure. The mean MHHS, SF-36 subscales, and patient satisfaction for group 1, group 2, and overall are listed in Table 2. The differences in scores between groups 1 and 2 were significant for all measures assessed. In addition, 13 of 19 patients in group 1 had high-demand military occupational specialties (MOSs; eg, infantrymen, military police) before surgery versus 7 of 14 patients in group 2. Postoperatively, 17 of 19 group 1 patients returned to their prior active-duty positions, whereas 2 transitioned to less strenuous MOSs (eg, combat support or administrative roles). In group 2, only 1 patient returned to strenuous military employment; 5 other patients were retained in the military and underwent a change of MOS to less demanding positions, whereas 8 patients were found unfit for duty and medically discharged.

TABLE 2
Group 1, Group 2, and Overall Results[a]

	Group 1: Non-disability	Group 2: Medical Evaluation Board Disability	*P*	Total
Mean SF-36 subscales				
Physical Function	51.5	34.2	<.0004	44.6
Bodily Pain	47.1	33.6	<.0001	41.7
Mental Component	56.2	45.0	<.02	48.6
Physical Component	47.3	30.3	<.0001	40.5
Mean MHHS (% good or excellent)	84.1 (68)	61.1 (0)	<.0001	73.4 (39)
Patient satisfaction, % VS or SS	84	50	<.05	70

[a]The Short Form–36 (SF-36) subscale scores are reported as norm-based values (population mean, 50; SD, 10). The modified Harris hip score (MHHS) range is 0 to 100, with 90 to 100 = excellent, 80 to 90 = good, 70 to 80 = fair, and <70 = poor. VS, very satisfied; SS, somewhat satisfied.

When the entire study sample was divided into 2 groups based on the presence or absence of advanced intraoperative chondromalacia, no significant difference in any of the outcome measures could be identified with the numbers available (Table 3). Likewise, age older or younger than 30 years was not a significant discriminator with regard to any of the outcome measures assessed. Outcomes for male patients were significantly better with regard to the SF-36 PF and MCS subscales as well as the MHHS. Similarly, only 58% of female patients were somewhat or very satisfied with the results of their procedure at final follow-up, as compared with 86% of male patients. However, this statistically significant relationship for outcomes based on gender did not hold up under multivariate analysis because of the substantially higher number of women

TABLE 3
Subgroup Analysis Based on Presence or Absence of Significant Chondral Damage[a]

	Chondral Defect: Outerbridge Grade III or IV	No Significant Chondral Lesion	*P*
Mean SF-36 subscale			
Physical Function	47.2	43.2	.41
Bodily Pain	44.2	40.4	.38
Mental Component	52.9	46.5	.20
Physical Component	45.9	32.7	.09
Mean MHHS (% good or excellent)	79.2 (60)	70.9 (30)	.29
Patient satisfaction, % VS or SS	70	70	1.00

[a]The Short Form–36 (SF-36) subscale scores are reported as norm-based values (population mean, 50; SD, 10). The modified Harris hip score (MHHS) range is 0 to 100, with 90 to 100 = excellent, 80 to 90 = good, 70 to 80 = fair, and <70 = poor. VS, very satisfied; SS, somewhat satisfied.

(58%) than men (21%) who were on MEB status. Specifically, multivariate (MEB status, gender, age, and cartilage condition) analysis revealed that only MEB status was independently predictive of worse MHHS (P = .001). Likewise, intragender t tests revealed significant differences between MEB and non-MEB MHHS for both men (61.6 vs 86.9, P = .03) and women (58.3 vs 80.2, P = .01).

DISCUSSION

General Health Assessment

Outcomes-based research is paramount in proving or assessing the efficacy of any operative or nonoperative treatment. Until recently, orthopaedic outcomes assessments have focused almost exclusively on joint- or disease-specific measures. Although valuable, this focus has the potential to result in excellent outcomes as assessed by the researcher or operative surgeon, whereas many patients remain unsatisfied. In addition, general patient physical and mental health can profoundly influence surgical outcomes. As a result of this factor, recent attention has focused on the inclusion of patient-based subjective outcomes measures and assessments of general patient health-related quality of life, such as the SF-36 and patient satisfaction questionnaires, when reporting surgical results.[4,22,34,35]

This study was the first to use the SF-36 generic health questionnaire in the assessment of outcomes after the arthroscopic debridement of acetabular labral tears. Our results demonstrated an excellent correlation between the MHHS and the SF-36 PF, BP, and PCS subscales. The MCS subscale demonstrated only fair correlation. In addition to providing numerical values to assess and compare outcomes, the SF-36 provides a validated, accepted, and widely used measure of general patient health. Although preoperative SF-36 values were not available in this retrospective study, they may be of significant clinical use. If preoperative SF-36 scores were uniformly low for this subgroup, then patients may have experienced a substantial increase in their outcomes scores despite having lower absolute scores postoperatively. Future study may then show that the score differential is the most revealing outcome measure for this subgroup; alternatively, future study may demonstrate that disability patients with profoundly lower preoperative scores experience minimal benefit from this type of surgical procedure and may suggest that patients be treated nonoperatively for acetabular labral tears until such a time when total hip arthroplasty is indicated.

Medical Disability Status

Patients undergoing orthopaedic procedures who are involved with disability claims have frequently been reported to do worse than do those patients who are not involved in such claims.[1,8,15,23,27,28,36] The military MEB process is similar to workers' compensation in that each involves patients seeking compensation for an injury related to their work. In both the military and civilian systems, the patients' fiscal compensation is directly related to their degree of impairment. The majority of the points in the MHHS are assigned for subjective measures of pain and difficulties with activities of daily living, as are many of the points for the SF-36. Patients with workers' compensation claims have been noted to have worse patient-reported subjective outcomes even when objective measures of function are equivalent to those of noncompensation patients.[3]

Therefore, it is not entirely surprising that patients in our study who were pending disability claims had poorer outcomes. What is surprising was how markedly MEB status influenced our surgical outcomes. The impact of disability compensation on hip arthroscopy results has been addressed in 2 previous studies. Byrd and Jones[7] reported that their 8 patients on workers' compensation or in pending litigation actually did better than the remaining patients did who were not involved in medicolegal actions; however, this difference was not statistically significant. Similarly, Farjo et al[10] reported that 8 of 28 patients (29%) who underwent hip arthroscopy for labral tears while covered under workers' compensation did not do significantly worse than did those not on workers' compensation. Our findings are in direct contradistinction to these results. Specifically, only 50% of MEB patients were very or somewhat satisfied with their surgical procedure, compared to 84% in our nondisability cohort (group 1). Likewise, no patient in the MEB group 2 scored good or excellent on the MHHS versus 68% of patients in group 1. As noted, this statistically significant discrepancy in results held true for all SF-36 subscales as well.

One potential issue with this study is that workers' compensation and military MEB status may not be equivalent for comparison. Overall, 1% to 3% of military personnel are placed on MEB status each year. The most frequent complaint resulting in MEB status, like that for workers' compensation, is low back pain. The next most common complaints are hip and knee pain. We believe MEB status is indeed similar to workers' compensation in that each is involved with compensation for an injury sustained while on the job. Similarly, in both modes of disability evaluation, fiscal compensation is directly related to the severity of patient physical impairment, pain, and suffering. Prior studies of spine surgery patients have equated MEB status in the navy with civilian workers' compensation.[19,36] These studies found that disability status significantly affected results after surgery for lumbar but not cervical disk disease and that higher compensation incentives correlated directly with poorer surgical outcomes. In addition, these studies demonstrated that the MEB is an excellent system for evaluating the effects of disability compensation on surgical outcomes.

Another potential confounding variable is that patients on MEB status may have had more severe symptoms preoperatively, necessitating MEB evaluation and producing a predilection for poor surgical outcomes in this cohort. As this study was retrospective in nature, preoperative MHHS and SF-36 data were not available. However, this potential conflict existed in previous studies on the effect of workers' compensation as well. In addition, all of our MEB patients were undergoing disability evaluation at the time of the surgery; therefore, MEB status in this instance was not merely a selector for or reflection of poor surgical outcomes. Instead, we believe that MEB status represents a significant preoperative predictor of poor surgical outcomes and that MEB status is an acceptable substitute for workers' compensation in evaluating its effect on outcomes in patients undergoing hip arthroscopy. These findings should be considered when conducting preoperative counseling or contemplating operative intervention in patients being evaluated for or receiving compensation for suspected labral injuries.

General Outcomes for Arthroscopic Partial Limbectomy

Hip arthroscopy for the treatment of acetabular labral tears is an evolving therapy, but the outcomes after labral debridement have been generally favorable, especially in well-selected populations.[7,10,11,24,29,31] Historically, the vast majority of labral tears not associated with DDH or posterior dislocation have been located in the anterior or anterosuperior regions, which is in agreement with our findings.[11,24,26,31] Only a single patient in our series had DDH, which has been definitively associated with both labral tears and premature joint degeneration and has been present in a much greater percentage (14%-100%) of patients in other surgical and radiographic labral tear series.[12,18,21,25]

Byrd and Jones[7] reported the 2-year outcomes in 25 of 35 patients who underwent hip arthroscopy for a variety of indications. The MHHS improved from a median of 57 preoperatively to 85 postoperatively, with the best results found for the treatment of labral tears or loose bodies. Santori and Villar[31] prospectively observed 76 patients treated for labral tears, with 58 patients available for follow-up at a mean of 3.5 years. Their primary outcome was patient satisfaction, which was achieved in 39 of 58 patients (67%). Our overall results demonstrated a slightly lower MHHS (73.4) and similar patient satisfaction (70%). We noted significant differences in the mean MHHS (84.1 vs 61.1) and patient satisfaction rates (84% vs 50%) between nondisability and MEB groups, respectively.

CONCLUSION

We found that the SF-36 general health questionnaire provided valuable outcomes information and demonstrated a good correlation with joint-specific outcome measures, specifically the MHHS, after arthroscopic partial limbectomy. We advocate the use of both a general health assessment tool, such as the SF-36, as well as a joint- or disease-specific assessment tool in future outcomes research. In addition, we expect that the results of the SF-36 will be even more informative when given both preoperatively and postoperatively. Our study also demonstrated that disability status has a profound adverse effect on outcomes after arthroscopic acetabular labral debridement. We therefore advocate cautious patient selection and detailed preoperative patient counseling before attempting arthroscopic labral debridement in patients undergoing disability compensation evaluation.

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