



Return to Duty After Mini-Open Arthroscopic-Assisted Treatment of Femoroacetabular Impingement in an Active Military Population

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Purpose: To report the return-to-duty rate and surgical outcomes in a military population after mini-open arthroscopic-assisted surgery for femoroacetabular impingement (FAI) in an effort to affirm its efficacy. **Methods:** A retrospective review of consecutive active-duty patients receiving mini-open arthroscopic-assisted surgery for FAI between 2007 and 2011 was performed. Patients younger than 18 years, non-active-duty patients, and patients with prior hip surgery were excluded. Demographic, radiographic, and duty-status data were collected. The primary outcome measure was a return to duty. Outcome scores were obtained in a proportion of the cohort, including the modified Harris Hip Score, Single Assessment Numeric Evaluation score, Western Ontario and McMaster Universities Osteoarthritis Index score, patient satisfaction score, and Veterans RAND 12 (VR-12) score. All patients had achieved a minimum of 1 year of follow-up at the time of assessment. All *P* values for significance were set at .05 or lower. **Results:** Of 182 patients (average age, 30.4 years), 156 (86%) were available for follow-up with return-to-duty data at an average of 2.8 years (range, 1-6 years). Of the patients, 78% returned to full duty (53%) or returned to duty with restrictions (25%). Outcome scores were available for 101 of 182 patients (55%) with duty rates similar to the total cohort (81% who returned to duty: 58% with no restrictions and 23% with restrictions). Return to duty correlated with improved outcomes compared with those who were medically discharged with respect to the modified Harris Hip Score (68.2 vs 54.5, *P* < .03), Single Assessment Numeric Evaluation score (48.2 vs 25.3, *P* < .02), and VR-12 physical (39.7 vs 33.2, *P* < .05) and VR-12 mental (54.5 vs 43.4, *P* < .005) scores. **Conclusions:** Mini-open arthroscopic-assisted surgery for FAI is successful in returning most service members to duty at short-term follow-up. Return correlates with improved outcome scores, although previously reported minimally clinical important difference and patient acceptable symptomatic state threshold values were not uniformly achieved. **Level of Evidence:** Level IV, retrospective case series.

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Significant heterogeneity of patient populations, reporting outcomes, treatment techniques, and potential risk factors for failure exists in the data regarding treatment of femoroacetabular impingement (FAI) syndrome.¹⁻⁴ Various surgical techniques have been implemented in the treatment of FAI, with no real consensus on which approach is the most beneficial—surgical dislocation, mini-open arthroscopic assisted, or all arthroscopic.⁵ Diagnostic utilities can be ambiguous as well because there is literature to suggest that over 92% of patients with asymptomatic hips show at least 1 radiographic parameter suggesting impingement morphology and over 85% of hips can have asymptomatic labral tears diagnosed on magnetic resonance imaging.⁶⁻⁸ Patient expectations, comorbidities, anatomic variations, body mass index (BMI), mental health issues, and concomitant osteoarthritis are just some of the factors that have been suggested to correlate with variable outcomes after surgery for FAI.⁹⁻²¹ This heterogeneity has led some insurance

companies to implement strict inclusion criteria or coverage rationales for patients desiring surgical intervention.²²

The military population is a unique subset of generally young, active patients in whom musculoskeletal injuries are common. The outcomes after treatment of FAI in this population suggest that approximately 75% of service members remain on active duty for at least 1 to 2 years after surgery.^{16,23-26} Similarly to the civilian population, health care insurance companies for uniformed service members have been hesitant to provide coverage for treatment of FAI. For example, it was not until January 2016 that the 2015 National Defense Authorization Act created a provisional coverage program allowing TRICARE (the health care program for uniformed service members and their families) referrals for FAI surgery from an authorized TRICARE provider.^{27,28} A review is scheduled to take place 4 years after implementation of this policy that will determine whether enough evidence supports FAI surgery as a standard treatment. Thus, in all populations that have to prove efficacy to allow reimbursement, there is a continued demand for clinical outcome studies that support surgical intervention for FAI.

The purpose of this study was to determine the return-to-duty rate and surgical outcomes in military services members who received arthroscopic-assisted mini-open surgery for FAI in an effort to affirm its efficacy for patients in whom nonoperative management has failed. We hypothesized that most patients would return to active-duty service with satisfactory outcomes after surgical treatment with this technique.

Methods

This was an institutional review board–approved study. A retrospective review was conducted of all active-duty military patients who underwent surgical treatment for FAI at a single military treatment facility between January 2007 and December 2011 by a single surgeon (G.Y.L.). All active-duty patients older than 18 years who received surgical treatment for FAI during the aforementioned period were included. A mini-open arthroscopic-assisted approach was used in all patients. Diagnoses were made clinically and radiographically by the treating attending who was a fellowship-trained hip and knee arthroplasty surgeon. Clinically, all patients had, at minimum, pain with attempted flexion, adduction, and internal rotation of the hip. Radiographically, cam lesions were diagnosed when an increased head-neck offset (alpha angle $>55^\circ$) was present, whereas pincer lesions were identified with a positive cross-over sign.^{1,5} The radiographic protocol included weight-bearing anteroposterior views of the pelvis and affected hip, as well as a frog-leg lateral view. Magnetic resonance images were not routinely obtained; however, when

available, they were read by a fellowship-trained musculoskeletal radiologist, and a note was made in preoperative planning for any labral or chondral defects. For the purpose of stratification in this study, patients were classified according to intraoperative findings of cam or pincer lesions as the primary pathology and surgical indication factor.

Military family members or veterans, patients younger than 18 years, patients undergoing surgery for diagnoses other than FAI, patients undergoing revision FAI surgery, and patients with a history of hip surgery were excluded. In all included patients, a formal physical therapy regimen of at least 3 months' duration had failed. All patients had a minimum follow-up period of 1 year at the time of return-to-duty and outcome assessments.

Medical records were reviewed for demographic data (age, sex, rank, branch of service), and surgery performed. Primary surgery performed was stratified as follows: patients with isolated cam lesions with femoral neck osteochondroplasty or patients with cam and pincer lesions with femoral neck osteochondroplasty and acetabular rim trimming. A note was made of concomitant procedures classified by intraoperative findings via arthroscopy or direct visualization. These procedures were performed at the discretion of the attending surgeon and included labral repair, labral debridement, chondroplasty, microfracture, loose body removal, capsular imbrication, bone grafting of a subchondral cyst, and iliotibial band release. Preoperative radiographs were reviewed for evidence of degenerative changes, and patients were stratified by joint space, as measured on a Synapse PACS (Fujifilm, Tokyo Japan), as follows: 2 mm or less versus greater 2 mm and 2 mm or less versus 3.5 mm or more. The age groups were 19 to 29 years, 30 to 39 years, and 40 years or more. The branches of service included Army, Navy, Marines, Air Force, and other. Ranks included junior enlisted, senior enlisted, junior officer, and senior officer.

Return-to-duty information was obtained using several data sources, including the U.S. Army e-Profile system; Physical Evaluation Board Liaison offices of the Army, Navy, or Marines; and medical records. Return-to-duty categories included the following: patients with a full return to active duty without activity restrictions or limitations (RTFD), patients who completed a medical board process (medical discharge) for hip pain or limitations (MEB), patients on a permanent profile (PP) for hip pain or surgery that limits their daily activities (this form of limited duty is only used by the Army), or patients on a temporary limited-duty profile (TP) for greater than 6 months because of hip pain or surgery. To be on any "profile" refers to the service member being placed on activity limitations directly related to his or her medical issue. Return-to-duty information

was not available for individuals in the Air Force, Coast Guard, or National Guard; thus, these patients were excluded from the analyses regarding return to duty.

Outcome scores were generated according to the Society of Military Orthopaedic Surgeons Quality Assurance registry using an online survey system (Socrates, Sydney, Australia). Outcomes included the modified Harris Hip Score (mHHS); Western Ontario and McMaster Universities Arthritis Index score; visual analog scale score for pain postoperatively; Single Assessment Numeric Evaluation (SANE) score; patient satisfaction scores for pain, whether patients would undergo the surgical procedure again, expectations, and perception of medical care received; and Veterans RAND 12 physical (VR-12p) and mental (VR-12m) scores. We contacted the patients to complete the online surveys via Socrates. Attempts were made to contact all eligible patients ($N = 182$). Patients who did not respond to contact attempts ($n = 57$) and patients who refused to participate ($n = 14$) were excluded. All patients underwent a mini-open arthroscopic-assisted anterior approach to the hip and postoperative protocol as described by Ernat et al.¹⁶ per the treating surgeon's preference.

Statistics

Statistical analysis was performed by a Ph.D. biostatistician. Duty status was analyzed for significance using the Student *t* test for proportions, examining whether there was parity with any other outcomes or whether the result was significantly better than 0. Percentages of duty status as they related to demographic variables, procedure, joint space, and other study variables were analyzed using Student *t* tests. Determination as to whether any of the study variables and outcomes were significant predictors of duty status and outcomes was conducted using multiple regression analyses. All statistics were performed using SPSS software for Windows (IBM, Armonk, NY), version 14.0 or higher, with significance verified by Statistical Analysis Software (SAS Institute, Cary, NC) as found. All *P* values for significance were set at .05 or lower.

Results

A total of 182 consecutive patients were identified with an average follow-up period of 2.8 years (range, 1-6 years). There were 134 men (74%) and 48 women (26%), and the average age was 30.4 years (range, 19-54 years). Of the patients, 44 (24%) had cam and pincer lesions whereas the remainder (76%) had isolated cam lesions (Table 1). At the time of final follow-up, 1 patient (0.5%) had undergone conversion to a total hip arthroplasty. Infections requiring a secondary procedure in the acute setting occurred in 2 patients (1%). At initial follow-up, 42 patients (23%) reported lateral femoral cutaneous nerve paresthesia. All but 2 of these cases resolved within 6 months: 1 resolved at

9 months, and the other never resolved. There was 1 case of pudendal nerve palsy (0.5%) that resolved within 4 weeks.

Return-to-Duty Cohort

Return-to-duty data were available for 156 Army, Navy, and Marine patients (87%). Of these patients, 35 (22%) received an MEB because of issues with their hips, 82 (53%) achieved an RTFD, and 39 (25%) were on either a PP or TP. Overall, 78% of patients were able to return to duty (RTFD plus PP and TP) postoperatively. Branch of service was found to be a risk factor when any return to work (RTFD plus PP and TP) was compared with an MEB ($P < .02$). Specifically, Marines were more likely than their Army counterparts to be medically discharged ($P < .01$) (Table 2).

Considering different age groups, patients aged 19 to 29 years who did not RTFD were more likely to receive an MEB than a PP or TP because of hip pain ($P < .01$). Patients aged 30 to 39 years showed comparable rates of MEB and PP or TP documenting activity restrictions as an alternative to RTFD. Lastly, patients older than 40 years were more likely to receive a PP for activity restrictions when they could not RTFD ($P < .01$) (Table 2).

No differences across rank categories (junior enlisted, senior enlisted, junior officer, and senior officer) were found regarding achieving an RTFD ($P > .05$). Alternative outcomes to an RTFD did differ, however, among these groups. Specifically, no senior officers were medically discharged, whereas the remaining ranks showed similar rates of this alternative outcome. Senior officers showed significantly higher rates of placement on a PP ($P < .02$) (Table 2). There were no statistically significant demographic risk factors for duty status identified in the study population regarding sex ($P > .7$), cam and pincer lesions versus cam lesions ($P > .8$), laterality ($P > .9$), or average age ($P > .1$) (Table 1).

Of the 156 patients, 73 (46%) required procedures in addition to femoral neck osteochondroplasty. Most of these procedures included acetabular chondroplasty, labral repair, or labral debridement. Other procedures included the following: labral repair and chondroplasty in 3 patients; labral repair and loose body removal in 1 patient; chondroplasty and labral debridement in 7 patients; labral debridement and microfracture in 1 patient; labral debridement and loose body removal in 1 patient; capsular imbrication in 2 patients; acetabular allograft for a subchondral cyst in 1 patient; partial iliotibial band release in 2 patients; and labral repair, chondroplasty, and microfracture in 1 patient. There was no difference in RTFD between patients with and those without concomitant procedures ($P < .001$). However, an MEB was the most likely alternative outcome in those who underwent isolated femoral neck osteochondroplasty ($P < .001$), whereas a PP was the most likely alternative

Table 1. Patient Demographic Characteristics

Patient Demographic Characteristic	Entire Cohort	RTFD	MEB	PP/TP	<i>P</i> Value
Sex					>.7
M	134	69%	69%	84%	
F	48	31%	31%	16%	
Age, mean (range), yr	30.4 (19-54)	30.1	27.1	29.7	>.1
Lesion					>.8
Cam	138	79%	83%	72%	
Cam and pincer	44	21%	17%	28%	
Laterality					>.9
Left		49%	51%	47%	
Right		51%	49%	53%	
Service*					
Army	113				
Navy	20				
Marine	29				
Air Force	18				
Other	2				

F, female; M, male; MEB, medical discharge; PP, permanent profile; RTFD, return to full duty; TP, temporary profile.

*The Navy and Marines do not have an option of TP. Return-to-duty data were not available for the Air Force and other services.

outcome in those who also received acetabular chondroplasty ($P < .001$) or labral repair ($P < .01$).

Preoperative electronic radiographs of 150 of 156 patients (96%) were available for review. Of these patients, 20 (13.3%) were found to have radiographic evidence of a joint space of 2 mm or less preoperatively, with an average measurement of 1.9 mm. The remaining 130 patients had an average joint space of 2.9 mm. No difference in the average age was found between these 2 groups (30.0 years and 30.5 years, respectively; $P > .8$). In addition, no differences in

return-to-duty status (RTFD plus PP and TP vs MEB) were found between these 2 groups ($P > .1$). In an effort to control for patients in the median of the study population, we compared patients with a joint space of 2 mm or less versus 3.5 mm or more; no differences in return-to-work status were found between these groups ($P > .3$). No difference in average joint space measurements was found between patients who were maintained on active duty (RTFD plus PP and TP) and those who received an MEB (2.7 mm and 2.9 mm, respectively; $P > .2$).

Table 2. Duty Status

	RTFD + Profiling (PP/TP), n (%)	MEB, n (%)	<i>P</i> Value
Total	121 (78)	35 (22)	
Branch			<.02
Army (n = 109)	91 (83)	18 (17)	
Navy (n = 18)	13 (73)	5 (28)	
Marines* (n = 29)	17 (59)	12 (41)	<.01
Age [†]			
19-29 yr (n = 91)	66 (73)	25 (27) [‡]	<.01
30-39 yr (n = 45)	36 (80)	9 (20)	
≥40 yr (n = 20)	19 (95)	1 (5) [§]	<.01
Rank			
JE (n = 47)	34 (72)	13 (28) [¶]	<.004
SE (n = 66)	50 (76)	16 (24) [¶]	<.004
JO (n = 18)	13 (72)	5 (28)	
SO (n = 16)	16 (100)	0 (0)	<.02

NOTE. *P* values are listed for statistically significant findings.

JE, junior enlisted; JO, junior officer; MEB, medical discharge; PP, permanent profile; RTFD, return to full duty; SE, senior enlisted; SO, senior officer; TP, temporary profile.

*Marines were more likely than their Army counterparts to be medically discharged ($P < .01$).

[†]All age groups and ranks were more likely to obtain an RTFD than other outcomes. *P* values indicate the most likely alternative outcome to an RTFD.

[‡]MEB was the most likely alternative to an RTFD in the group aged 19 to 29 years.

[§]PP or TP was the most likely alternative to an RTFD in the group aged 40 years or older.

^{||}Ranks were available for 147 patients.

[¶]SE and JE patients were more likely to receive an MEB than SO patients as an alternative to an RTFD.

Table 3. Outcome Scores Based on Duty Status

	RTFD	PP/TP	MEB	All Patients With Outcome Scores
mHHS	68.2	63.1	54.5*	64.9
WOMAC	25.2	25.6	38.7	28.2
VAS pain	49.6	57.6	59.3	53.1
SANE	48.2	42.1	25.3 [†]	42.7
VR-12p	39.7	39.9	33.2*	38.4
VR-12m	54.5	51.8	43.4 [†]	51.9

MEB, medical discharge; mHHS, modified Harris Hip Score; PP, permanent profile; RTFD, return to full duty; SANE, Single Assessment Numeric Evaluation; TP, temporary profile; VAS, visual analog scale; VR-12m, Veterans RAND 12 mental; VR-12p, Veterans RAND 12 physical; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

*Values were statistically significantly different from the RTFD group but not the PP/TP group based on $P < .05$.

[†]Values were statistically significantly different from the RTFD and PP/TP groups based on $P < .05$.

Outcome Score Cohort

Of 182 patients, 101 (55%) completed outcome scores at an average follow-up of 3.5 years. This cohort comprised 73 men (72%) and 28 women (28%), and the average age was 32.7 years (range, 19-53 years). Left-sided surgery was performed in 48 patients; 72 patients (71%) presented with cam lesions, whereas 29 (29%) presented with cam and pincer lesions. Overall, 57 patients (56%) also underwent a concomitant procedure.

In this cohort, 59 patients (58%) had an RTFD, 23 (23%) were placed on a PP or TP, and 19 (19%) were medically discharged because of issues with their hips. No significant differences in the rates of the 3 return-to-duty statuses were found between the cohort of 101 patients who completed outcome scores and the 156 patients with return-to-duty data ($P > .5$). The outcome scores based on duty status are listed in Table 3.

MEB patients had statistically significantly lower mHHS values than RTFD patients ($P < .03$); lower SANE scores than RTFD plus PP and TP patients ($P < .02$); lower VR-12p scores than RTFD patients ($P < .05$); and lower VR-12m scores than RTFD plus PP and TP patients ($P < .005$). Regarding demographic factors in this subset,

younger age was more predictive of being medically discharged ($P < .02$), whereas older age was more predictive of higher patient satisfaction regarding pain ($P < .04$), patient expectations ($P < .002$), perception of quality of medical care received ($P < .0001$), and whether patients would undergo the surgical procedure again ($P < .006$). In this subset of patients, no other correlations were found to be significant regarding branch of service, laterality, deformity type, or whether a concomitant procedure was performed ($P > .05$).

In this subset of patients with outcome scores, preoperative radiographs were available for 96 of 101 patients (95%). Joint space narrowing of the operative hip of 2 mm or less was present in 9 patients (9%), at an average of 1.7 mm. The average joint space in the remaining 87 patients (91%) was 2.9 mm. No difference in the average joint space was found between patients with an RTFD plus PP or TP (average, 2.9 mm) and patients with an MEB (average, 2.6 mm) ($P > .07$). No differences in any of the average outcome scores were found between those with a joint space of 2 mm or less and those with more than 2 mm ($P > .2$) (Table 4). No difference in the average age was found between those with a joint space of 2 mm or less and those with more than 2 mm (35.1 years and 33.0 years, respectively; $P < .6$). In an effort to control for patients in the median of the study population, we also noted that there were no differences in outcome scores when comparing patients with a joint space of 2 mm or less versus those with 3.5 mm or more (Table 4).

Discussion

The overall return-to-duty rate for this active-duty military population in whom conservative management failed and who underwent surgical treatment for FAI was 78% at an average follow-up of 2.8 years. Of these patients, 53% had no activity restrictions. Return to duty correlated with statistically significantly higher outcome scores in a smaller but statistically similar population of patients. This included better mHHS, SANE, VR-12p, and VR-12m scores. It is important to recognize, however, that although a statistically significant difference was found, this may not correlate to a

Table 4. Outcome Scores as Stratified by Joint Space

	≤2 mm (n = 9)	>2 mm (n = 87)	P Value for	
			≤2 mm vs > 2 mm	≥3.5 mm (n = 20) vs ≥ 3.5 mm
mHHS	56.9	63.7	>.2	67.0
WOMAC	41.3	27.4	>.2	24.3
Pain	61.9	52.6	>.5	52.8
SANE	36.3	43.0	>.9	43.8
VR-12p	37.1	38.7	>.7	39.5
VR-12m	47.8	52.1	>.4	53.3

mHHS, modified Harris Hip Score; SANE, Single Assessment Numeric Evaluation; VR-12m, Veterans RAND 12 mental; VR-12p, Veterans RAND 12 physical; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

clinical difference. Regarding our minimum follow-up period of 1 year, Chahal et al.²⁹ showed that the minimally clinically important difference (MCID) in the mHHS was 20 at 12 months. To our knowledge, the MCIDs for the SANE and Veterans RAND 12 scores as they pertain to surgical treatment for FAI have not been determined.

When we considered an alternative to a restriction-free return to duty, younger patients were more likely to be medically discharged because of issues with their hips whereas older patients were more likely to be retained and to be more satisfied with the procedure and care received. These results are comparable to those reported by Reiman et al.,²³ who performed a systematic review of 5 current military studies reporting return to duty. Their data suggested that 57% to 84% of patients receiving arthroscopic or mini-open arthroscopic-assisted surgery for FAI will return to duty and that 39% to 59% of patients will do so without restrictions.

Although our results are comparable to those found in other military studies, we also sought to compare and contrast our outcomes to those observed in the general population receiving FAI surgery. These results are comparable to those reported in civilian studies describing the mini-open arthroscopic-assisted technique.³⁰⁻³² For example, Cohen et al.,³⁰ in 2012, reported on 59 amateur athletes aged 17 to 60 years with an average follow-up period of 22 months. Of the 44 patients who had achieved 1-year follow-up, 55% were playing sports at their preoperative levels.

We recognize that despite a 78% return-to-duty rate, the postoperative mHHS values for patients who returned to duty were 68.2 (RTFD) and 63.1 (PP or TP), respectively. Clohisy et al.,³¹ also performing combined hip arthroscopy and limited open osteochondroplasty, reported an average improvement in the mHHS from 63.8 preoperatively to 87.4 at final follow-up, with 83% of their patients having at least a 10-point improvement. Lincoln et al.³² reported an increase in the mHHS from 63.8 to 76.1 using a modified Heuter anterior approach combined with adjunctive hip arthroscopy. Chahal et al.²⁹ calculated the patient acceptable symptomatic state (PASS) and determined a value of 84 at 1 year of follow-up. It is difficult to say why our scores were lower than those in previous studies; however, we maintain that despite these numerical differences in outcome scores, the ability to return to duty or play remains comparable. As the primary outcome of our series, this ability to maintain individuals in the working military force should be highlighted.

In addition, we used a mini-open arthroscopic-assisted approach and have no comparison to other described treatment strategies including arthroscopic or surgical hip dislocation. The literature suggests that comparable results can be achieved with any of the 3

approaches, with open procedures having higher major complication rates, mini-open procedures have a higher incidence of lateral femoral cutaneous nerve injury, and arthroscopic procedures largely depending on surgeon experience.⁵ Therefore, we believe that these results can be applied across patient populations with other treatment strategies.

Although we could not identify a demographic factor that correlated with failure of a full return to duty, we did find that Marines were more likely to be medically discharged than their Army counterparts. In addition, when stratified by age, certain patterns of alternative outcomes were shown. Younger patients and junior enlistees are more likely to be medically discharged, whereas older patients and senior officers increasingly received permanent activity restrictions when a full return to duty was not achieved. This can most likely be accounted for in that as soldiers age and therefore progress in their military careers, they are more likely to consider alternative options to medical discharge, such as activity modifications, that will aid in completing a military career. They may also be nearing retirement and thus be more likely to retire before they would be medically discharged. Retirement data are not a part of the medical records in this retrospective review; however, no patients retired within our study period at an average follow-up of 2.8 years after surgery. Furthermore, in lower-ranking soldiers, their command or job description typically does not provide any flexibility in training regimens and higher physical activity demands may be required.

No additional procedures were more predictive of a full return to duty; however, patients who underwent labral repair and acetabular chondroplasty performed in conjunction with femoral neck osteochondroplasty were more likely to receive permanent activity restrictions as an alternative outcome compared with patients who underwent femoral neck osteochondroplasty alone. One might suggest that this indicates degenerative or traumatic pathology, in conjunction with femoral neck deformity, as a contributing factor to the ultimate outcome. The correlation of poor outcomes of FAI surgery and joint space narrowing of 2 mm or less has been previously established in the literature.¹³⁻¹⁵ We did not find any correlation between joint space narrowing and a return to duty in our population, nor did joint space narrowing correlate with poorer outcome scores. However, the sample size of the group of patients with a joint space of 2 mm or less was small, and thus, although the differences were not statistically significant, we do not believe that we can reach a definitive conclusion regarding this factor.

Starting in January 2016, the 2015 National Defense Authorization Act allowed provisional coverage by TRICARE to refer service members to authorized surgeons who perform FAI surgery.^{27,28} Despite the large

body of evidence that suggests successful outcomes in active populations, the question remains as to why coverage was not provided sooner than 2016. It is likely because of the variability of reporting clinical findings, radiographic findings, and outcomes in the literature.¹⁻⁴ TRICARE is not the only health care insurance entity that has been hesitant to provide coverage for FAI surgery. Other institutions have created strict policy statements governing when FAI surgery is indicated, maintaining that criteria be met based on very specific demographic, clinical, and radiographic findings.²² Health care policies, in general, are becoming more stringent and focused on surgical indications, outcomes, and performance measures. To overcome such challenges, in 2016, the Warwick Agreement on FAI syndrome was convened to build an international, multidisciplinary consensus on the diagnosis and management of patients with FAI syndrome.³³ With surgical treatment returning most of our patients to duty and significantly reducing or eliminating their disability, this study adds to the present collection of literature that serves as an affirmation of the efficacy of FAI surgery in the active-duty population.

Limitations

There are several limitations to this study. First, the study used a retrospective design without preoperative functional and pain measures. Given that conservative treatment had failed in all patients prior to surgery, we can assume that all patients were physically unfit for duty because of their hips. Second, we recognize that our follow-up rate for outcome scores of 55% is low. This information does supplement our primary outcome measure of duty status in that a linear relation existed between the ability to return to duty and higher outcome scores; however, given the significant differences in follow-up rates, we recognize that we cannot make any definitive comparisons between these 2 groups. Third, we did not account for other potential factors that could influence outcomes after surgery for FAI, including BMI. Associations have been observed with postoperative outcome and increased BMI; however, our medical record system did not universally account for patients' heights and weights at the time of surgery.¹⁰ Fourth, although our average follow-up period was 2.8 years, the minimum follow-up period was 1 year. In general, longer-term follow-up would be ideal to observe the natural history of this cohort. Although the military is a closed system, the continual migration of service members around the world to various duty stations can make follow-up challenging. Conversely, 1 year of follow-up may seem short, but in a military population, this may not necessarily be so. If a Navy or Marine service member extends beyond a total of 12 months of temporary duty restrictions, he or she is automatically referred for a medical discharge.

The Army has recently adopted similar protocols. Kierkegaard et al.³⁴ showed that clinically relevant pain and activities-of-daily-living function improvements are first reported between 3 and 6 months and sport function improvements are reported between 6 months and 1 year after surgery for FAI. Other studies have shown that although improvement can occur through up to 2 years of follow-up, the greatest improvements occur through 3 to 6 months postoperatively.^{35,36} Thus, knowledge of duty status at 1 year of follow-up could be reflective of our primary outcome, as well as projected outcome. There also exists a treatment bias in our study, in that we cannot perform comparisons with those surgeons performing open or all-arthroscopic procedures. In addition, because of some of the small numbers of patients in the various branch and rank groups, the data lack power when reporting any differences in these demographic characteristics. Lastly, one might argue that our results are not applicable to the general population. Although we do not have occupational demographic characteristics in this study, the military population, in general, represents an active population similar to amateur athletes reported in the literature. In addition, occupations in the armed forces resemble those reflected in the general population: police, fire and rescue, nurses, emergency medical technicians, electricians, mechanics, and pilots, as well as "weekend warriors" and recreational athletes. Special operations soldiers or sailors with higher demands or skills may receive more training, patient-focused therapy, and access to more technologically advanced resources and providers in their preparation for and recovery from surgery, similarly to the high-level professional athlete. The profile (e.g., activity restriction) and medical evaluation board system (e.g., medical discharge) are comparable to Workers' Compensation or work limitations in the general population. Thus, the findings of this study could be applicable across all activity levels and occupations of the civilian population. Finally, 95% confidence intervals and group percentages for achieving MCID and PASS thresholds are unable to be determined because the lead statistician who held the data set for this project died (as noted in the "Acknowledgment" section).

Conclusions

Mini-open arthroscopic-assisted surgery for FAI is successful in returning most service members to duty at short-term follow-up. Return correlates with improved outcome scores, although previously reported MCID and PASS threshold values were not uniformly achieved.

Acknowledgment

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