

# Hip arthroscopy in the warrior athlete: 2 to 10 year outcomes

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Submitted 4 July 2015; Revised 6 October 2015; revised version accepted 24 October 2015

## ABSTRACT

Hip disorders are increasingly recognized among athletic populations. The rigors of military service expose individuals to the same risks as those participating in competitive sports, compounded by potential exposure to violent macrotrauma. This is a retrospective review of prospectively collected data among 62 active duty military personnel (64 hips) with 2–10-year follow-up.

Follow-up averaged 47 months (range 24–120 months). The average age was 30 years (range 17–53 years) with 45 males and 17 females; 37 right and 27 left hips. Duration of symptoms prior to arthroscopy averaged 28 months (range 6–168 months). The average improvement was 22 points (pre-op 63; post-op 85) using the 100-point modified Harris hip score and was statistically significant ( $P < 0.001$ ). Patients were improved after 60 of 64 procedures (94%) and returned to active duty following 52 (80%) and an average of 5 months (range 1 week–15 months). Forty-six (72%) underwent correction of FAI including 27 combined, 17 cam and two pincer lesions. Overall diagnoses and procedures are detailed. One patient underwent repeat arthroscopy and remained improved at 2-year follow-up; none were converted to total hip arthroplasty. There were two minor complications, a transient ulnar nerve neurapraxia and superficial sensory dysesthesias of the foot, both of which resolved within a few days. This is a heterogeneous cohort of pathology, but illustrates that hip disorders may exist among active duty military personnel and may benefit from arthroscopic intervention. A sense of awareness is important for accurate diagnosis and timely treatment.

## INTRODUCTION

Non-specific hip pain is a relatively common diagnosis as a duty-limiting condition among active military personnel with an estimated incidence of 3.3% based on an ICD9 query of the Total Army Injury and Health Outcomes Database (TAIHOD) [1]. Specific joint disorders are less common, with only a 1.4% incidence, and most of these (76%) are classified only as a sprain or synovitis. Due to the historically elusive nature of many hip joint disorders, it is likely that these statistics vastly under-represent the number of structural joint problems.

Hip problems, especially femoroacetabular impingement (FAI), have been increasingly reported among athletic populations with significant damage occurring among young active adults [2–9]. Uniformed men and women participating in the rigors of military service are at risk for the same disorders as those participating in competitive sports. At a minimum, they are required to regularly complete a physical fitness test. This is compounded by potential exposure to blunt and penetrating macrotrauma. Thus, these authors dubbed this military population the warrior athlete.

We postulate that hip disorders may be a problem for individuals participating in military service and that arthroscopy may have a role in treatment. The purpose of this study is to report the demographics of hip disorders among military personnel encountered at a single center and present the outcomes of arthroscopic treatment.

### METHODS

This is a retrospective analysis of prospectively collected data. The study group consists of warrior athletes who underwent hip arthroscopy. Inclusion criteria consisted of only active duty military personnel that had achieved at least 2-year follow-up. None were excluded. The cohort consists of 64 consecutive hips among 62 military personnel (two bilateral). All were assessed with a modified Harris hip score preoperatively and postoperatively at 3, 12, 24, 60 and 120 months. This study and the data reported were granted exemption status by the investigational review board.

The indication for arthroscopy was clinical findings of joint pathology amenable to arthroscopic intervention or recalcitrant hip pain unresponsive to non-surgical treatment. Assessment was based on history, physical examination and imaging studies which routinely included radiographs and MRI and then CT scan in the assessment of FAI. Diagnostic fluoroscopic or ultrasound guided intra-articular anesthetic injections were utilized when the source of pain was not clear or when more than one potential pain generator was present.

Routine arthroscopy was performed utilizing the supine position, assessing both the central and peripheral compartments as previously described [10]. Labral tears were debrided or repaired as dictated by the suitability of the tissue. Chondral lesions were addressed with chondroplasty and microfracture for Grade IV Outerbridge lesions. Pincer and cam lesions were addressed with acetabuloplasty and femoroplasty when present [11]. Synovial disease and lesions of the ligamentum teres were resected as necessary with shavers and thermal ablation and loose and foreign bodies were removed.

Each patient was evaluated by the center's physical therapist on the day following surgery. A formal rehab protocol was implemented dictated by the pathology encountered and the procedure performed [12]. This was then coordinated through communication with the therapy department of the soldier's home military base. Simple debridement procedures were allowed to weight bear as tolerated with crutches for 1 week to normalize gait. Femoroplasties were weight bearing as tolerated with crutches for 4 weeks. Labral repairs were 50% weight bearing for 4 weeks with precautions against external rotation

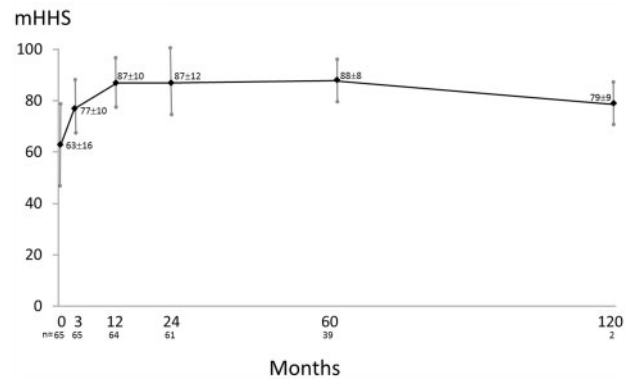


Figure 1. Scores at Various Intervals

and flexion beyond 90°. Microfractures were kept on a more strict protected weight bearing status for 8 weeks. Functional progression was allowed at 3 months, anticipating resumption of military responsibilities by 4–6 months.

### RESULTS

Follow-up averaged 47 months (range 24–120 months). The average age was 30 years (range 17–53 years) with 45 males and 17 females; 37 right and 27 left hips. Service branches included 55 Army, four Navy and three Air Force. Duration of symptoms prior to arthroscopy averaged 28 months (range 6–168 months). The mechanism of injury was variable. The average improvement was 22 points (pre-op 63; post-op 85) which was statistically significant ( $P < 0.001$ ). Patients were improved after 60 of 64 procedures (94%) and returned to active duty following 52 (80%) and an average of 5 months (range 1 week–15 months). The scores at various time intervals are summarized in Fig. 1. Four patients (6%) eligible for 5-year follow-up were lost (three after 1 year and one after 2 years). Three of these four were improved at last follow-up, but only one had returned to duty. 46 (72%) underwent correction of FAI including 27 combined, 17 cam and two pincer lesions. Other procedures and diagnoses are detailed in Tables I and II. One patient underwent repeat arthroscopy and remained improved at 2-year follow-up; none were converted to total hip arthroplasty. There were two minor complications, a transient ulnar nerve neurapraxia and superficial sensory dysesthesias of the foot, both of which resolved within a few days.

### DISCUSSION

This is a heterogeneous cohort of pathology but provides a significant sense of perspective on how hip disorders expose some of the unique challenges of treating military

**Table I. Pathology identified**

<b>Pathology identified</b>	<b>n</b>
Labral tear	54
Acetabular chondral lesions (15 Gr IV, 22 Gr III, 2 Gr II, 4 Gr I)	43
Synovitis	39
Ligamentum teres lesion	15
Loose bodies	11
Snapping Iliopsoas	6
Femoral chondral lesions (2 Gr IV, 2 Gr III)	4
Adhesions	3
Absent ligamentum teres	1
Shrapnel	1
Previous AVN	1
Dysplasia	1

**Table II. Procedures performed**

<b>Procedures performed</b>	<b>n</b>
Labral debridement	39
Synovectomy	39
Chondroplasty	34
Femoroplasty	34
Acetabuloplasty	29
Debridement of ligamentum teres	15
Labral refixation	14
Microfracture	13
Removal of loose bodies	12
Iliopsoas release	6
Debridement of adhesions	3
Labral repair	1
Removal of suture	1

personnel and how this population illustrates some of the unique aspects of treating hip disorders.

Duration of symptoms prior to surgery averaged 28 months, which is comparable to what these authors have

reported in a non-military athletic population (30 months); but represents a substantial amount of time when measured against the backdrop of an average military career, which is 8.6 years for enlisted personnel [2, 13]. Previous studies have reflected on the elusive nature of hip disorders evading accurate diagnosis [14]. These challenges are compounded in a military population by numerous factors. Compared with knee and shoulder, there has been a paucity of experts in hip disorders and the military system has benefited the least from this expertise. The highly mobile, transient nature of military existence for both the patient and providers creates a challenge for continuity of follow-up care. These challenges of continuity enhance the evasiveness of hip disorders in defying diagnosis. This is being combated by strategies such as the Wounded Warrior Program focusing on providing comprehensive continuity of care for injured military personnel with a purpose of either returning them to military service, or preparing them for a productive civilian life [15].

Eighty percent of those eligible were able to return to active duty. This is a respectable percentage but, in contrast, is less than the 90% return to sport reported previously among athletes with FAI [3]. However, in that study, it was noted that 85% of intercollegiate and 95% of professional athletes returned to their sport, indicating that there are other influencing factors besides simply the surgical procedure. This is also true of our warrior athletes. Not all military personnel may be equally motivated to return to harm's way. More practically, for some service men and women with protracted difficulties, the determination was already made to plan on a medical discharge and they were simply waiting on surgery and subsequent recovery to complete their medical care. Thus, when guiding the post-op rehabilitation process, it is important to develop a sense of awareness of the patient's goals and motivation. These factors are sometimes evident but are sometimes subtle and may obligate interpretation on the part of the clinician. If some soldiers struggle with their recovery, decisions must be made on whether further investigation and treatment is warranted, or sometimes whether to bring closure, accepting a result less than full return to activities. This observation has been more precisely quantified by Potter et al. [16], in the only previously reported outcomes study of hip arthroscopy in a military cohort. All patients underwent labral debridement, and they noted that those involved in the process of a medical evaluation board which is the military equivalent of disability compensation did poorer than those not involved in this process.

Military personnel face exposure to all of the potential risks of other athletes plus violent blunt and penetrating trauma, which are potentially daily occupational hazards.

Treating athletes with potentially career threatening injuries requires an awareness of both the physical and psychological components. This is also true in the warrior athlete, which has its own unique set of challenges.

It is difficult to make meaningful comparisons to other non-military populations. This is a modest heterogeneous group that begins when FAI was just being recognized, and labral restoration techniques were first being developed. A high male-to-female ratio is consistent with male dominance in the military system.

### Limitations

This is a heterogeneous study population recorded over an 8-year period during which both the understanding of hip disorders and surgical techniques evolved. The modified Harris hip score, although validated, is an imperfect tool for quantitating outcomes among active individuals. Newer instruments are now available and will be applicable for future studies.

### CONCLUSIONS

This is a modest observational study of a heterogeneous group of pathology with all of the concomitant limitations. It is meant mostly to express a sense of awareness that hip disorders can be a significant source of dysfunction among military personnel; the diagnosis can be elusive but, with proper workup and treatment, closure can be accomplished in returning to active duty or preparing for eventual civilian life.

### ACKNOWLEDGEMENTS

The authors gratefully acknowledge the efforts of John M. (JT) Tokish, MD, Colonel, USAF-MC (Ret.) in assimilating the Armed Services data.

### FUNDING

This research was performed at Nashville Sports Medicine Foundation. During the study period, Nashville Sports Medicine Foundation received research support from Smith & Nephew Endoscopy.

### CONFLICT OF INTEREST STATEMENT

J. W. T. Byrd is a consultant for Smith & Nephew Endoscopy; he is a non-paid consultant and has stock in A3 Surgical.

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