Systematic Review

Most Military Service Members Return to Activity Duty With Limitations After Surgery for Femoroacetabular Impingement Syndrome: A Systematic Review

Michael P. Reiman, PT, DPT, OCS, SCS, ATC, FAAOMPT, CSCS, Scott Peters, PT, DPT, ATC, MS, CSCS, and Daniel I. Rhon, PT, DPT, DSc, OCS, FAAOMPT

Purpose: Determine which proportion of active-duty service members return to duty (RTD), RTD without limitations, which surgical intervention returns these personnel at a better proportion and with the ability to perform their military duties after surgery compared with the pre-injury state. **Methods:** A computer-assisted search of MEDLINE, EMBASE and SCOPUS databases was performed with keywords related to RTD for femoroacetabular impingement (FAI) syndrome. The *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* guidelines were used for study methodology. Methodologic quality of individual studies was assessed with the Methodological Index for Non-Randomized Studies scale. **Results:** A total of 5 studies (884 service members/886 hips) qualified for inclusion. Limited evidence from level III to IV studies indicates that service members RTD at a proportion ranging from 57% (95% confidence interval [CI]: 53% to 62%) to 84% (95% CI: 73% to 91%), but only 39% (95% CI: 35% to 44%) to 59% (95% CI: 49% to 69%) do so without limitations. Mean duration of follow-up was 33.2 ± 11.3 months. No studies reported on actual duty requirements before versus after surgery, RTD criteria, or career longevity. Only 1 of 5 studies reported the RTD time-frame (mean 5 months). Only 2 of 5 studies reported complications, with a rate of 9.4% ± 6.3%. Three of 5 studies reported failures at a rate of 7.2% ± 4.7%, respectively. Femoroplasty (mean 56% of procedures in 4 studies) and acetabuloplasty (mean 55% of procedures in 4 studies) were the most commonly used procedures in studies reporting. **Conclusions:** RTD is poorly defined in the included studies. Limited evidence substantiates that approximately 75% of service members remain on active duty for at least 1 to 2 years after surgery for FAI syndrome, whereas only approximately 47% do so without limitations at mid-term follow-up. Similarly, despite improvements in patient-reported outcome measures, service members still report continued pain and functional limitations after FAI syndrome surgery. **Level of Evidence:** Level IV, systematic review of Level III and IV studies.

See commentary on page 2726

From the Department of Orthopedic Surgery, Duke University Medical Center (M.P.R.), Durham, North Carolina; Toronto Blue Jays Baseball Club (S.P.), Toronto, Canada; Physical Therapy, Baylor University (D.R.), Waco, Texas; and the Clinical Outcomes Research, Center for the Intrepid, Brooke Army Medical Center (D.R.), San Antonio, Texas, U.S.A.

The authors report that they have no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

Disclaimer: The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army Medical Department, the U.S. Army Office of the Surgeon General, the Department of the Army, Department of Defense, or the U.S. Government.

Received December 10, 2017; accepted May 7, 2018.

Address correspondence to Michael P. Reiman, PT, DPT, OCS, SCS, ATC, FAAOMPT, CSCS, Duke Doctor of Physical Therapy Program, Durham, NC 27705, U.S.A. E-mail: reiman.michael@gmail.com

0749-8063/171496/$36.00

https://doi.org/10.1016/j.arthro.2018.05.011

There has been an increasing focus in the sports literature with regard to treatment outcomes and expectations after surgical intervention for femoroacetabular impingement (FAI) syndrome, with recent reviews reporting on the correlation of surgical intervention and return-to-sport.[1,2] Due to similarities in rigor and repetitive trauma, service members have been referred to as "warrior athletes,"[3] susceptible to similar musculoskeletal conditions, including FAI syndrome.[3,4]

The exact prevalence of FAI syndrome in active-duty service members is difficult to ascertain. This is primarily because most of the medical data used for epidemiologic purposes (Military Health System Data Repository) is based on standard diagnosis codes (International Classification of Diseases), and no code currently exists for FAI syndrome. However, there are reported estimates of approximately 24,000

non-arthroplasty hip surgeries covered by the Defense Health Agency's insurance program (TRICARE) in both military and civilian hospitals between June 1, 2004, and July 30, 2013.[5] After removing those younger than 18 or older than 50, as well as any other reasons that could potentially necessitate hip surgery (fracture, neoplasm, infection, etc.), there were approximately 7200 cases.[5] Considering that all patients with FAI syndrome will not be treated solely with surgery, the true prevalence of this condition in the military is likely much higher.

The benefit of surgical intervention in active-duty service members is unclear. Therefore the purpose of this systematic review was to determine the proportion of active-duty service members who return to duty (RTD), who RTD without limitations, which surgical intervention returns these personnel at a better proportion, and the ability to perform their military duties after surgery compared with before injury. Based on published studies examining return to sport in athletes and our experience, our hypotheses are that there will be a greater proportion of military personnel who RTD without rather than with limitations, as well as limited reporting on the type of surgical intervention, correlation to other outcomes, and comparison of the ability to perform their military duty before versus after surgery.

Methods

Protocol and Registration

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used during the search and reporting phase of this review. The PRISMA statement includes a 27-item checklist that is designed to be used as a basis for reporting systematic reviews of randomized trials,[6] but the checklist can also be applied to multiple forms of research methods.[7]

The study was registered on October 27, 2017, with the International Prospective Register of Systematic Reviews (PROSPERO). PROSPERO is a database of prospectively registered systematic reviews for health and social topics. The study was registered after the pilot search and before the updated data search and extraction. This study was exempt from the institutional review board.

Identification and Selection of the Literature

A computer-assisted literature search of MEDLINE, EMBASE, and SCOPUS databases was performed from inception of each respective database until October 15, 2017. Unpublished literature was also searched during this timeframe. The goal was to optimize the sensitivity of our search strategy[8] and to increase the likelihood that all appropriate studies were identified. The search strategy was developed in collaboration with a biomedical librarian and used controlled vocabulary and key words related to return to sport relative to FAI syndrome and labral tear. Screening filters were initially used during assessment of title, abstract, and full text documents. The search was further limited to humans and English language—only publications. Reasons for study exclusion are listed in Appendix I. The full search strategy for MEDLINE is listed in Appendix II. Because computerized search results for diagnostic accuracy data frequently omit relevant articles,[9,10] systematic reviews and included articles were additionally screened to detect eligible studies that were not identified by the electronic search. To be included in the systematic review, the studies had to satisfy the following criteria:

- Study design: Prospective or retrospective randomized controlled trial, cohort or case series with a population greater than 10 service members.
- Patients: Military service members in any age group or active duty level with diagnosis of FAI syndrome (as diagnosed by each respective study). At least 80% of service members in study had to be treated primarily for FAI syndrome/labral tear. Patients without a diagnosis of FAI syndrome but treated with hip preservation surgery; patients with hip dysplasia, labral tear only, slipped capital femoral epiphysis, or Legg—Calve—Perthes disease; patients with previous hip arthroscopic or open surgery (revision surgery); and patients undergoing periacetabular osteotomy were all excluded.
- Intervention: Patients had to be treated with hip surgery (e.g., open, arthroscopy, combination procedures).
- Comparator: not applicable.
- Outcomes: Primary outcome was report of RTD. Secondary outcomes included patient-reported outcome measures, surgical complication and failure proportions, service members and active duty types included, surgical procedures used, career longevity, and return to duty criteria.
- Time: all time-frames reporting RTD will be included.

Studies were additionally excluded if any of the following were met: 1) systematic reviews focusing on the FAI syndrome surgical procedures, 2) studies written in a language other than English, 3) cadaver studies, 4) surgical technique studies, 5) hip surgeries for conditions other than FAI syndrome, or 6) studies not reporting quantifiable RTD data.

To identify relevant articles, titles and abstracts of all identified citations were independently screened by two authors. Full-text articles were retrieved if the abstract provided insufficient information to establish eligibility or if the article passed the first eligibility screening.