



Risk factors for surgical complications in rotator cuff repair in a veteran population



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Background: Technical advances have allowed arthroscopic rotator cuff repair to supplant open repairs with similar outcomes. However, few data exist to support the theoretical decrease in complications with the arthroscopic technique.

Methods: We used the Veterans Administration Surgical Quality Improvement Program database from the entire U.S. Veterans Administration system. We obtained perioperative data of all patients undergoing rotator cuff repair between 2003 and 2008. Single and multivariate analyses were performed to evaluate risk factors for perioperative complications associated with rotator cuff surgery.

Results: There were 6975 open rotator cuff repairs and 2918 arthroscopic rotator cuff repairs performed with similar patient age, gender breakdown, body mass index, and comorbidities. Complications occurred in the early postoperative period in 2.1% of the open repair group and 0.9% of the arthroscopic repair group ($P < .0001$). The prevalence of both superficial and deep wound infection was higher in the open group compared with the arthroscopic group (1% vs. 0.1% superficial, $P < .0001$; 0.3% vs. 0.1% deep, $P = .11$). Return to the operating room within the 30-day surveillance period occurred in 1.1% of the open repair patients compared with 0.5% of patients undergoing arthroscopic repairs ($P < .0001$). -Multivariate logistic regression analysis revealed that the arthroscopic group had a significantly lower risk of complications ($P = .0001$), a lower rate of superficial infection ($P = .0002$), a lower incidence of return to the operating room within 30 days ($P = .007$), and a lower risk of hospital readmission ($P < .0001$).

Conclusion: Arthroscopic rotator cuff repair in the veteran population resulted in a lower incidence of perioperative complications compared with open repair.

Level of evidence: Level III, Retrospective Cohort Design with Large Database, Treatment Study. Published by Elsevier Inc. on behalf of Journal of Shoulder and Elbow Surgery Board of Trustees.

Keywords: Rotator cuff; repair; veteran; arthroscopy

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The opinions expressed are those of the authors and not necessarily those of the Department of Veterans Affairs or the United States Government.

This study was approved by the IRB at Bay Pines VA Healthcare System, Bay Pines, FL, USA.

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Table I Demographic variables

	Open (N = 6975)	Arthroscopic (N = 2918)	P value
Age, mean (SD)	58.3 (9.5)	57.7 (9.5)	.0018
Body mass index, mean (SD)	29.9 (5.9)	29.7 (5.2)	.35
Smoking (pack-years), mean (SD)	15.4 (26.4)	12.5 (27.9)	<.0001
Male, % (n)	95.4 (6655)	94.3 (2751)	.02
Mean alcohol >2 drinks/day in 2 weeks before admission, % (n)	7.5 (519)	7.0 (204)	.42

SD, standard deviation.

Bold numbers indicate values that are statistically significant.

Repair of the rotator cuff is performed for pain relief and the improvement of function, and it can be accomplished either open or through an arthroscopic approach.¹⁸ Studies comparing open with arthroscopic rotator cuff repair have shown a potential benefit with improved outcomes in the arthroscopic group,^{3,19} although Maffulli et al showed no differences between the 2 techniques in postoperative quality of life as measured by the 36-Item Short Form Health Survey.¹³ Little is known of the risk factors for perioperative complications in rotator cuff repair. Given the typical advanced age and comorbidities of patients undergoing surgery for rotator cuff tears, an improved understanding of the complex interplay between both modifiable and nonmodifiable risk factors could have significant implications for the care of these patients.

Many aspects of rotator cuff repair have yet to be defined, including demographic utilization of rotator cuff repair surgery, perioperative mortality rate, risk factors for mortality, perioperative complication rate and classification, risk factors for perioperative complications, and risk factors for poor outcome and revision surgery. Some of these factors have been examined in a group of patients undergoing total shoulder replacement.²¹

We evaluated the risk factors for complications of rotator cuff repair in the veteran population using the Veterans Administration Surgical Quality Improvement Program (VASQIP) database, a quality assurance database of surgical cases performed in Veterans Administration (VA) medical centers. Our goal was to evaluate modifiable and nonmodifiable risk factors in veterans undergoing open and arthroscopic rotator cuff repair as well as to descriptively evaluate outcomes and complications from each procedure type. We hypothesized that complication rates would be lower in the arthroscopic cohort.

Methods

The VASQIP collects morbidity and mortality data from surgical procedures at VA surgical programs nationwide.⁵ The overall goal is to measure and to improve the quality of surgical care by studying data from multiple centers as well as to provide estimates of procedural risk based on a large data sample. Each hospital has specifically identified personnel who are tasked with chart review and entry of data from all surgical patients.

We queried the VASQIP data from 2003 to 2008 for patients undergoing rotator cuff repair using the *Current Procedural Terminology* codes for open rotator cuff repair (23410, 23412, and 23420) and arthroscopic repair (29827). We analyzed a robust panel of demographic and medical data on our cohort. The demographic factors included age, race, and sex. Preoperative medical history included prior cardiac illness, cerebrovascular disease, renal disease, peripheral vascular disease, smoking, alcohol consumption, diabetes mellitus, nutritional status, and a full complement of laboratory panels.

The operative variables obtained included the time of anesthesia and surgery, American Society of Anesthesiologists (ASA) classification, *Current Procedural Terminology* codes, anesthesia technique, and level of training of surgeon. Postoperative data points included length of hospital stay as well as any readmissions within 30 days. Postoperative complications noted included cardiac events, cerebrovascular events, blood transfusions, repeated intubations, urinary tract infections, and wound complications.

Bivariate and multivariate analysis was performed to compare the open and arthroscopic cohort data.

Results

During the 5-year period spanning 2003 to 2008, there were 6975 open rotator cuff repairs and 2918 arthroscopic cuff repairs (Table I). During this period, the number of arthroscopic cases increased each year, from 131 performed in 2003, to 427 in 2005, up to 737 in 2008. In the open surgery cohort, there were 6655 men and 320 women, with an average age of 58.3 years (range, 22-90 years). The mean body mass index in this group was 29.8, with a large range from 14 to 177. In comparison, the arthroscopic rotator cuff group had 2751 men and 167 women, with an average age of 57.7 years (range, 20-89 years). The average body mass index was similar to that of the open group at 29.7, with a narrower range of 14 to 56.

Comorbidities

Preoperatively documented comorbidities were similar between the open and arthroscopic groups, including diabetes (approximately 13% of each group had non-insulin-dependent diabetes and 5% had insulin-dependent diabetes), chronic obstructive pulmonary disease, dialysis use, cancer diagnosis, chronic steroid use, transient

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