JSES International 6 (2022) 963–969

Contents lists available at ScienceDirect

JSES International

journal homepage: www.jsesinternational.org

Rate and time to return to shooting following arthroscopic and open shoulder surgery

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ARTICLE INFO

Keywords:
Shoulder surgery
Arthroscopy
Shooting
Rifle
Return to shooting

Level of evidence: Level IV; Case Series; Prognosis Study

Background: There is limited information on return to shooting following shoulder surgery. The purpose of this study is to determine the rate and timing for resuming shooting a rifle following shoulder surgery.

Methods: We performed a retrospective review of prospectively collected data. The study included patients undergoing arthroscopic and open shoulder stabilization for unidirectional shoulder instability, and arthroscopic surgery for rotator cuff tears, SLAP lesions, biceps tendinopathy, and acromioclavicular pathology. Data collected included the laterality of surgery, shooting dominance, and patient-reported outcome measures at the preoperative and postoperative visits. Starting at the 4.5-month clinic visit, patients were asked if they could shoot a military rifle.

Results: One hundred patients were identified with arthroscopic and open shoulder surgery with a mean age of 30 years (range, 18-45) and a mean follow-up of 24 months (range, 12-32). The cohort consisted of patients undergoing arthroscopic Bankart repair (n = 23), arthroscopic posterior labral repair (n = 18), open Latarjet (n = 16), mini-open subpectoral biceps tenodesis (OBT) (n = 25), OBT with open distal clavicle resection (DCR) (n = 10), open DCR (n = 4), and arthroscopic rotator cuff repair with concomitant OBT (n = 4). Significant improvement in SSV, VAS, ASES, and WOSI was shown at 1-year postoperative, SSV 85, VAS 2, ASES 85, WOSI 239, $P = .001$. The percentage of patients reporting the ability to shoot a military rifle postoperatively were 47%, 63%, 85%, and 94% at 4.5 months, 6 months, 1 year, and 2 years, respectively. At 4.5 months postoperatively, patients who underwent surgery ipsilateral to their shooting dominance (n = 59) had a rate of return to shooting (33%) versus shoulder surgery on the contralateral side of shooting dominance (n = 41) (60%), $P = .04$. However, there was no significant difference in the groups at 6 months and 1 year. Additionally, there was a significant difference in the rate of return to shooting at 6 months in patients undergoing arthroscopic posterior labral repair versus the remainder of the cohort (posterior instability (33%) vs. (69%), $P = .016$), and a significant difference between posterior shoulder stabilization and anterior shoulder stabilization (70%), $P = .03$.

Conclusion: Patients undergoing arthroscopic and open shoulder surgery have a high rate of return to shooting. Approximately 60% of patients resume shooting at 6 months postoperatively and 85% return at 1 year. Patients undergoing shoulder surgery on the contralateral side of their shooting dominance return to shooting significantly faster than those with shoulder surgery ipsilateral to their shooting dominance. Additionally, those undergoing arthroscopic posterior shoulder stabilization return to shooting at a slower rate than anterior stabilization surgery.

Shooting a rifle is a required task for many military athletes and law enforcement, and can be a leisure or competitive activity for civilian patients. Rifle shooting imparts a sudden anterior to posterior directed force against the anterior shoulder. This can lead to rare cases of symptomatic posterior shoulder instability.[5]

Madigan Army Medical Center Institutional Review Board approved this study, IRB Protocol #221092.

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https://doi.org/10.1016/j.jseint.2022.07.010

Additionally, the recoil of the rifle and the need to suspend and support the weapon with both upper extremities to successfully hit a target requires unique demands on both the affected and unaffected shoulder.[11] Rifle stability is achieved through compression of the buttstock against the shoulder while supporting the stock of the rifle with the contralateral arm through isometric elbow flexor contraction and shoulder forward elevation. Therefore, the dynamic task of rifle shooting involves a coordinated effort of the operative and nonoperative shoulder following shoulder surgery.

There is limited information on successful return to shooting following shoulder surgery. In fact, no prior studies have examined the rate or time to return to rifle shooting following shoulder surgery. This information would be valuable for military and law enforcement employers and patients, and also for patients seeking to understand the time to return to recreational and leisure shooting.

The purpose of this study is to determine the rate and timing for resuming shooting a rifle following arthroscopic and open shoulder surgery. We hypothesized that there would be a high rate of return to shooting a rifle following arthroscopic and open shoulder surgery.

Methods

After institutional review board approval, we performed a retrospective review of prospectively collected data from a single institution. The study included all active duty military patients, age 18 to 45 years old, undergoing arthroscopic and open shoulder stabilization for symptomatic unidirectional shoulder instability, as well as patients undergoing arthroscopic surgery for rotator cuff tears, superior labrum anterior to posterior (SLAP) lesions, biceps tendinopathy, and acromioclavicular (AC) pathology. One hundred twenty-four patients were identified. Patients were excluded if they had less than 1-year follow-up. Therefore, 100 patients were available with the return to shooting data, clinical outcome scores, and at least 1-year clinical follow-up.

Shoulder arthroscopy, biceps tenodesis with or without distal clavicle resection, and rotator cuff repair: indications, operative technique, and rehabilitation

Patients were indicated for shoulder arthroscopy, open subpectoral biceps tenodesis, with or without distal clavicle resection if they had history, physical examination, and advanced imaging findings consistent with a symptomatic SLAP tear, rotator interval pulley lesion, or biceps tenosynovitis. Patients with both anterior Zone 2 biceps groove tenderness to palpation and a positive Speed's examination that replicated their anterior shoulder pain underwent a preoperative ultrasound-guided biceps groove diagnostic injection of a combined mixture of local anesthetic and steroid. For these biceps tenosynovitis patients, they were indicated for surgery if they sustained 75%-100% pain relief from the injection. Furthermore, for patients with symptomatic AC joint pathology, patients were indicated for surgery following significant improvement in a fluoroscopic guided AC joint diagnostic and therapeutic injection. Young active duty patients with rotator cuff tears were indicated for surgery after failure of at least 6 weeks of nonoperative treatment with dedicated physical therapy, and had history, physical examination, and imaging findings concordant with a symptomatic rotator cuff tear.

All biceps tenodesis, AC joint and rotator cuff repair procedures were performed in the beach chair position first with a diagnostic shoulder arthroscopy and biceps tenotomy, followed by an open subpectoral biceps tenodesis with a unicortical biocomposite double-loaded suture anchor as previously described.[13] All distal clavicle resections were done through an open superior approach with 8 mm of distal clavicle resection. Rotator cuff repairs were performed arthroscopically with suture anchors. Postoperatively, all biceps tenodesis patients underwent a standard institutional rehabilitation protocol with passive range of motion starting at 2 weeks, active range of motion at 6 weeks, and strengthening starting at 8 weeks. Heavy lifting or resisted supination was prohibited until 8 weeks postoperative. For patients who underwent arthroscopic rotator cuff repair, rehabilitation was generally 4 to 6 weeks in a shoulder immobilizer in abduction (this was based on the intraoperative size and morphology of the tear). Then passive range of motion began at 4 to 6 weeks, active range of motion at 8 weeks, and rotator cuff strengthening at 12 weeks.

Arthroscopic shoulder stabilization: indications, operative technique, and rehabilitation

For unidirectional anterior and posterior shoulder instability cases, patients were indicated for arthroscopic anterior and posterior shoulder stabilization if they had history, physical examination, and imaging findings consistent with recurrent unidirectional anterior or posterior shoulder instability. Additionally, indications for arthroscopic Bankart repair were patients with no prior surgery with less than 13.5% anterior inferior glenoid bone loss and on-track Hill–Sachs lesions. All arthroscopic stabilization procedures were performed in the lateral decubitus position with a minimum of 3 knotless suture anchors. A mean of 4.3 knotless suture anchors were utilized for arthroscopic Bankart repair and a mean of 3.9 knotless suture anchors for arthroscopic posterior labral repair (Fig. 1). Postoperative rehabilitation consisted of shoulder immobilizer wear for 6 weeks with no active use of the arm and early initiation of passive range of motion. The therapy regimen for arthroscopic posterior stabilization differed from arthroscopic Bankart repair in that it emphasized protecting the posterior capsule with restrictions in internal rotation until 3 months postoperatively, whereas arthroscopic Bankart repair patients had no restrictions in internal rotation at 6 weeks.

Open shoulder stabilization: indications, operative technique, and rehabilitation

Patients were indicated for the open Latarjet procedure if they had "critical" (greater than 20 percent) glenoid bone loss, greater than 13.5% glenoid bone loss with an offtrack Hill–Sachs lesion, and had history of a failed arthroscopic Bankart repair with bipolar bone loss. All Latarjet procedures were performed in the beach chair position through an open approach, subscapularis split, and two solid fully threaded 3.5 mm bicortical screws. Postoperatively, Latarjet patients started pendulum exercises immediately, passive range of motion at 2 weeks postoperatively, active range of motion at 4 weeks, and strengthening at 8 weeks. All arthroscopic and open shoulder surgery patients were allowed to return to shooting a rifle at 4.5 months per the standard institutional rehabilitation protocol.

Data collected

Demographic data were collected for all patients, including the laterality of surgery, patient hand dominance, and shooting dominance (Table I). Shooting dominance was defined as the side the patient places the rifle on while firing. For example, a left shooting dominant patient placed the buttstock in the left anterior shoulder and pulled the trigger with the left index finger. Patient-reported outcomes collected included the Subjective Shoulder Value (SSV), American Shoulder and Elbow Surgeons (ASES) score, visual analog scale (VAS) score for pain, and the Western Ontario Shoulder

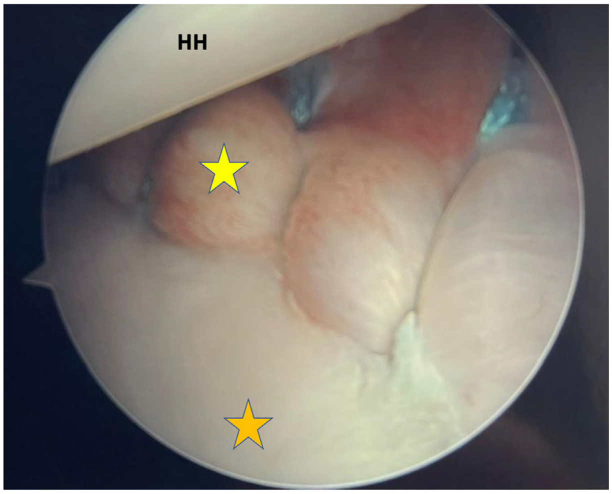

Figure 1 Arthroscopic photo status post right arthroscopic posterior capsulolabral repair with 4 knotless suture anchors. Patient is positioned in the lateral decubitus position. (☆ – posterior labrum, ★ – glenoid, *HH* – humeral head).

Instability (WOSI) index at the preoperative visit and short-term postoperative visits. At the 4.5-month, 6-month, 1-year, and 2-year clinic visits, patients were asked if they could shoot a military rifle and patient-reported outcome measures were collected. The current military rifle in use is the M4 carbine which is a 5.56 mm, gas operated, magazine fed, carbine assault rifle (Fig. 2). The civilian equivalent rifle is the AR-15. Although officers in the military (as opposed to enlisted soldiers) are typically assigned a pistol for shooting, the 2 officers in our cohort were “dual carry,” and had to qualify also on an M4 rifle.

Statistical analysis

Descriptive statistics were determined for the study cohort’s variables. Univariate analysis was performed for all variables. The Mann-Whitney nonparametric test for unpaired samples was used for continuous variables, and the 2-tailed Fisher exact test was used for categorical data. Multivariate logistic regression was utilized to determine independent variables significantly associated with the ability to return to shooting at 6 months postoperatively. The statistical significance was set to a P value of .05. All statistics were performed using online software (https://www.easymedstat.com).

Results

One hundred patients were included in the final analysis. The mean age was 30.8, range (18-45), with a predominantly male cohort. Ninety percent of the cohort was right hand dominant, and 84% reported right side shooting dominance, with 16% left shooting dominant (Table I). Median baseline preoperative patient-reported outcomes were as follows: SSV 50, VAS 7, ASES 42, and WOSI 1419. Significant improvement in SSV, VAS, ASES, and WOSI was shown at 1-year postoperative, SSV 85, VAS 2, ASES 85, WOSI 239, P = .001 (Table II). The percentage of patients reporting the ability to shoot a military rifle after surgery was the following: 47%, 63%, 85%, and 94% at 4.5 months, 6 months, 1 year, and 2 years, respectively. At 4.5 months postoperatively, patients who underwent shoulder surgery ipsilateral to their shooting dominance (n = 59) had a rate of return to shooting (33%) vs. shoulder surgery on the contralateral side of shooting dominance (n = 41) (60%), P = .04. However, there was no significant difference in the groups at 6 months and 1 year (Fig. 3).

Table I
Demographics.

	Shoulder surgery ipsilateral to shooting dominance (N = 59)	Shoulder surgery contralateral to shooting dominance (N = 41)	P value
Mean age, years (SD)	30 (7.9)	31 (8.4)	.33
Sex (male:female)	58:1	39:2	.61
Laterality of surgery (R:L)	48:11	5:36	**.001**
Hand dominance (R:L)	53:6	37:4	.99
Shooting dominance (R:L)	48:11	36:5	.41
Diagnosis (%)			
Anterior shoulder instability	23 (39)	16 (39)	.81
Posterior shoulder instability	10 (17)	8 (20)	
SLAP tear	9 (15)	3 (7)	
Biceps tendinopathy	14 (24)	10 (24.5)	
AC joint arthritis	2 (3)	3 (7)	
Rotator cuff tear	1 (2)	1 (2.5)	
Surgery performed (%)			
Arthroscopic Bankart repair	12 (20)	11 (27)	.46
Arthroscopic posterior labral repair	10 (17)	8 (20)	
Open Latarjet	11 (19)	5 (12)	
Biceps tenodesis	16 (27)	9 (22)	
Biceps tenodesis + DCR	6 (10)	4 (9.5)	
Open DCR	1 (2)	3 (7)	
Arthroscopic RCR + BT	3 (5)	1 (2.5)	
Open: arthroscopic	38:21	23:18	.65
Posterior instability diagnosis (Yes:No)	10:49	8:33	.99
Mean follow-up (mo), (range)	24 (12-32)	24 (12-33)	.99

SD, standard deviation; *R*, right; *L*, left; *SLAP*, superior labrum anterior to posterior; *AC*, acromioclavicular; *DCR*, distal clavicle resection; *BT*, biceps tenodesis; *RCR*, rotator cuff repair.
Bold indicates statistical significance value (P < .05).

Subgroup analyses

In subgroup analyses, there was no difference in rate and time to return to shooting in patients who underwent arthroscopic (n = 39) vs. open shoulder surgery (n = 61). Furthermore, there was no significant difference in the rate and time to resuming shooting a rifle at any time point between patients undergoing surgery for a diagnosis of shoulder instability (n = 57) vs. non-instability diagnoses (n = 43) (Table III).

Arthroscopic posterior shoulder stabilization: subgroup analysis

However, when we analyzed patients who underwent arthroscopic posterior shoulder stabilization (n = 18) vs. the remainder of the cohort (n = 82), there was a statistically significant difference in the rate and time to return to shooting at 6 months postoperatively, posterior instability (33%) vs. (69%), P = .016. At 1 year postoperatively, there was no significant difference between the groups (87%) vs. (84%), P = .99. At 6 months postoperatively, patients who underwent arthroscopic posterior labral repair ipsilateral to their shooting dominance (n = 10) had a rate of return to shooting (22%) vs. posterior labral repair on the contralateral side of shooting dominance (n = 8) (57%), P = .30. In addition, there was a statistically significant difference in the rate and time to return to shooting at 6 months postoperatively between patients undergoing shoulder surgery for posterior instability (33%) versus anterior instability (70%), P = .03.

In multivariate logistic regression analysis, a diagnosis of posterior shoulder instability was independently significantly associated with the inability to return to shooting a rifle at 6 months postoperatively, P = .01.

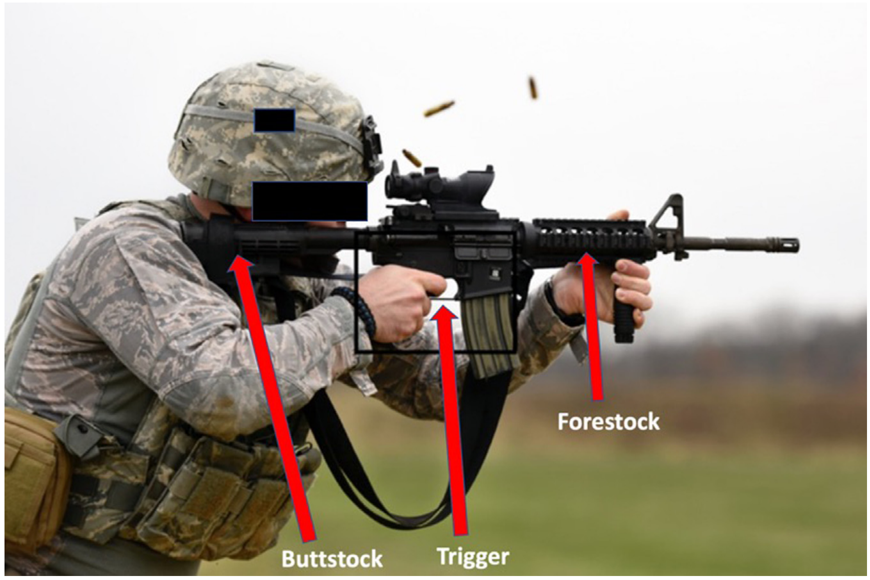

Figure 2 Picture of a right shooting dominant active duty soldier firing the M4 rifle. The buttstock is held against the right anterior shoulder. The left arm supports the forestock of the rifle.

Table II
Clinical outcomes.

	Preop	6 weeks postop	3 mo postop	4.5 mo postop	6 mo postop	1 y postop	2 y postop
Median SSV	50	60	70	75	80	85	80
Median VAS	7	3	2	3	2	2	2
Median ASES	42	53	72	73	82	85	80
Median WOSI	1419	1213	724	678	305	239	350

SSV, Subjective Shoulder Value; *VAS*, visual analog scale score for pain; *ASES*, American Shoulder Elbow Surgeons score; *WOSI*, Western Ontario Shoulder Instability Index.

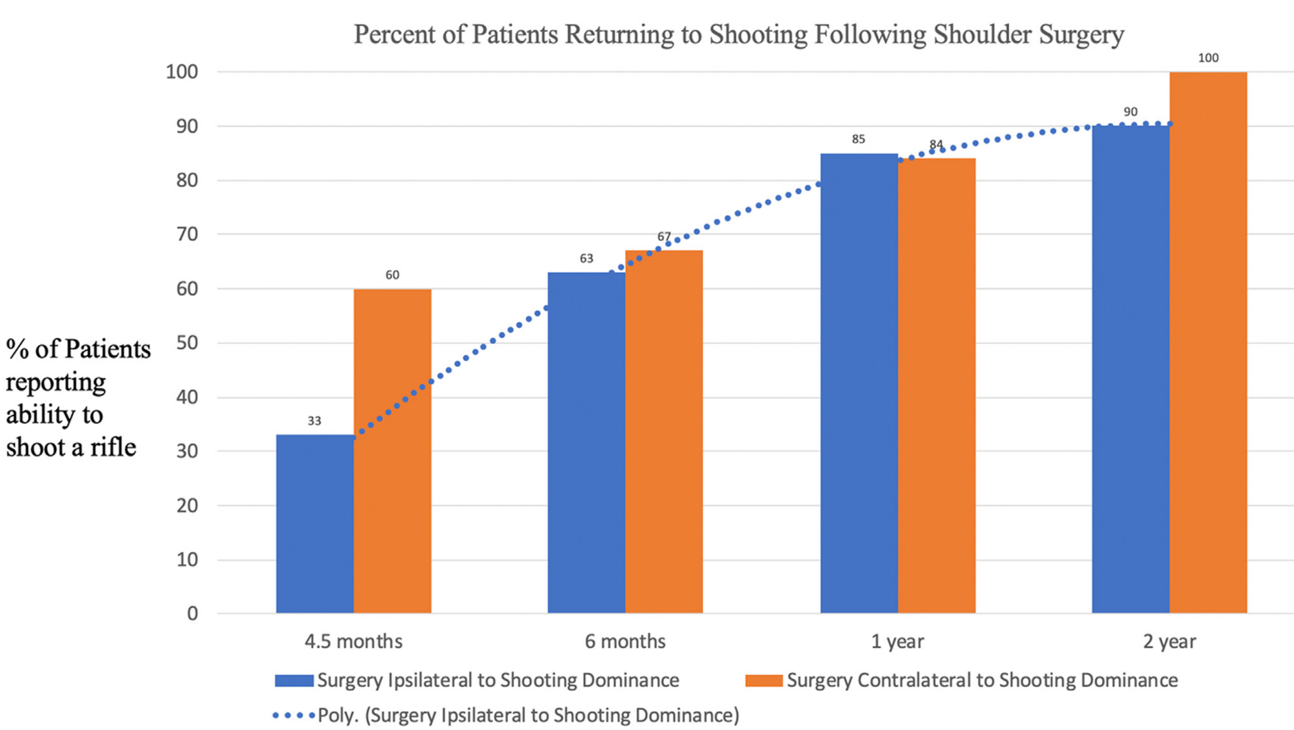

Figure 3 This bar graph depicts the speed of recovery and rate and time to resuming shooting a rifle following arthroscopic and open shoulder surgery. Patients who underwent shoulder surgery ipsilateral to their shooting dominance are represented by the blue bars, and those that underwent shoulder surgery contralateral to their shooting dominance by the orange bars.

Table III
Return to shooting: instability surgery versus non-instability surgery.

	Instability surgery (N = 57)	Non-instability surgery (N = 43)	*P* value
Mean age, y (SD)	26 (5)	36 (7)	**.001**
Sex (male:female)	56:1	41:2	.59
Hand dominance (R:L)	53:4	37:6	.50
Shooting dominance (R:L)	52:5	32:11	.06
4.5 mo − able to shoot rifle (%)	49	44	.92
6 mo − able to shoot rifle (%)	56	70	.29
1 y − able to shoot rifle (%)	92	77	.08
2 y − able to shoot rifle (%)	92	95	.29

SD, standard deviation; *R*, right; *L*, left.
Bold indicates statistical significance value ($P < .05$)

Complications/reoperations

There were 4 complications (4/95) 4.2%. Four patients who underwent open Latarjet had transient sensory neuropraxias (3 axillary and 1 musculocutaneous) which all completely resolved by 4 weeks postoperatively. Two of the axillary nerve sensory neuropraxias were identified in the postoperative recovery room and resolved by the 2-week postoperative visit. This was a 4/16 (25%) rate of transient sensory neuropraxia. There were no permanent nerve injuries. Three of the 4 Latarjet procedures with temporary sensory neuropraxias returned to shooting at 4.5 months, and the other patient reported returning at 6 months postoperatively. Two patients who underwent arthroscopic Bankart repair reported reinjuries with recurrent traumatic subluxation events (2/23) (8.7%), and declined to undergo further surgery. The first of these patients reported not being able to return to shooting at 6 months postoperatively, and the second patient reported the ability to return to shooting at 4.5 months postoperatively and then sustained the reinjury 1 year after surgery. One patient who underwent open Latarjet for greater than 20% glenoid bone loss had coracoid graft lysis without recurrent instability. He later sustained a traumatic rotator cuff tear after a motor vehicle collision and underwent an arthroscopic rotator cuff repair.

Discussion

The primary findings of this study are that there is a high rate of return to shooting a rifle following arthroscopic and open shoulder surgery in young patients. Based on our cohort of 100 patients, 63% reported the ability to shoot their rifle at 6 months and 85% at 1 year postoperatively. Patients who underwent shoulder surgery ipsilateral to their shooting dominance returned to shooting significantly slower than those with surgery contralateral to their shooting dominance. However, there was no significant difference in the groups at 6 months and 1 year. Interestingly, when we analyzed the group of patients who underwent arthroscopic posterior shoulder stabilization versus the remainder of the cohort, there was a significant difference in the rate and time to return to shooting at 6 months postoperatively, with posterior instability patients having a lower rate, posterior instability (33%) vs. (69%). At 1 year postoperatively, there was no significant difference between the groups. Additionally, at 6 months postoperatively, patients who underwent arthroscopic posterior labral repair ipsilateral to their shooting dominance had a rate of return to shooting (22%) vs. posterior labral repair on the contralateral side of shooting dominance (57%). Therefore, this study identified two important findings. First, patients undergoing surgery ipsilateral to their shooting dominance return at a slower rate. Second, patients undergoing arthroscopic posterior shoulder stabilization return to shooting at a slower rate.

There is limited evidence on return to shooting a rifle following arthroscopic or open shoulder surgery. However, there are a number of studies reporting on return to sport (RTS) and return to duty (RTD). Prior studies have reported that the return to sport and return to duty following biceps tenodesis and treatment of shoulder instability is approximately 4 to 5 months.[1-3,6,7,10,12,14] Provencher et al reported on 101 patients who underwent open subpectoral biceps tenodesis and found that 82% of patients returned to duty at a mean of 4.1 months.[12] Cassidy et al performed a systematic review and found that military patients returned to duty at 5.4 months following biceps tenodesis.[3] Abdul-Rassoul et al and Hurley et al performed systematic reviews to determine the mean time to return to play following arthroscopic Bankart repair and open Latarjet, respectively.[2,10] The mean time to RTS was 5.9 months for arthroscopic Bankart repair and 5.8 months for open Latarjet. Cruz et al evaluated the rate and time to return to duty following open Latarjet in patients with glenoid bone loss, and found 89% were able to return to full unrestricted duty at a mean of 5.3 months.[6] The difficulty in using 'return to duty' as an outcome measure is that it is too broad, and RTD varies based on a number of variables including rank (junior vs. senior enlisted), military occupational specialty, the unit's training cycle, and other psychosocial factors. Additionally, many military studies utilize profiling data to retrospectively determine RTD. This data is limited in its fidelity secondary to a number of variables inherent to the military profiling system. In this study, we attempted to take a more granular approach by asking patients specifically if they could shoot their military rifle at each postoperative time point, and then we retrospectively reviewed this prospectively collected data. We included 4.5 months as a follow-up time point as patients undergo a significant amount of progression in their activities, range of motion, and strength in between the typical 3 and 6-month follow-up clinic visits.

Interestingly and as one might expect, patients who underwent surgery ipsilateral to their shooting dominance (ie, right shooting dominance with right shoulder surgery or left shooting dominance with left shoulder surgery) returned to shooting significantly slower than those with contralateral surgery to their shooting dominance. Furthermore, posterior shoulder stabilization patients returned to shooting at a significantly slower rate, especially if they had surgery ipsilateral to their shooting dominance. However, at 1 year postoperatively there was no significant difference between any of the groups. The reasons that arthroscopic posterior stabilization patients returned to shooting at a slower rate is unclear; however, based on our data we hypothesize that it is likely related to the following points. First, the anterior to posterior directed force of the rifle's recoil places stress on the repaired posterior capsulolabral repair and this leads to patients having apprehension about returning to shooting. Second, the rehabilitation protocol for arthroscopic posterior labral repair is slower than the protocol for anterior shoulder stabilization and for shoulder arthroscopy and OBT plus or minus DCR. Our rehabilitation protocol restricts internal rotation in posterior labral repair patients until 3 months postoperatively. This may account for the slower return to shooting.

Interestingly, in this cohort, we also prospectively collected the ability to return to shooting at 3 months postoperatively. We found that 37% of patients reported the ability to shoot their rifle at 3 months including one patient following open Latarjet for critical glenoid loss and a history of over 50 dislocation events and dislocating in his sleep (Fig. 4). Of the patients who reported the ability to shoot a rifle at 3 months postoperatively, none of them had a postoperative complication or were a clinical failure of surgery based on their postoperative clinical outcome scores. Although

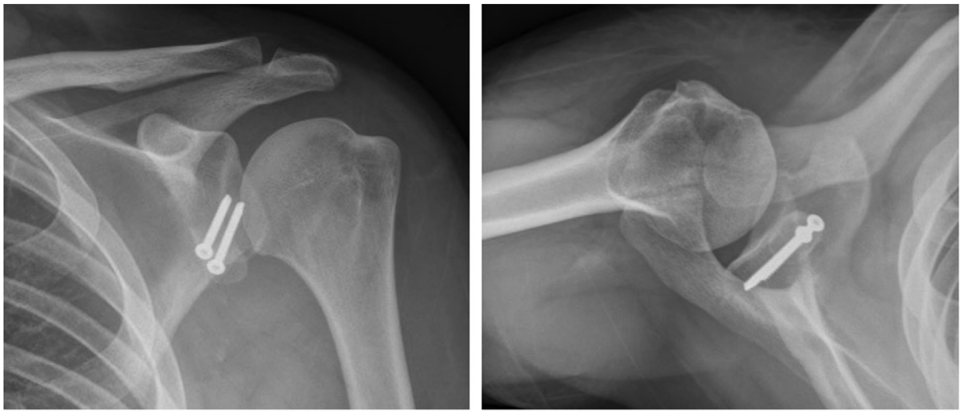

Figure 4 Anteroposterior (AP) and axillary lateral views of a young male patient who was an active duty infantryman status post open Latarjet procedure. At 3 months postoperatively, the patient reported the ability to shoot his military rifle.

Table IV
Recoil of commonly utilized shoulder-fired rifles.

Cartridge	Free recoil energy (ft-lbs)	Recoil velocity (ft/sec)	Average muzzle velocity (ft/sec)
.223 / 5.56	5.48	6.65	3122
.270 Winchester	17.64	11.64	2944
.308 Winchester	18.27	11.62	2491
.30-06 Springfield	21.34	12.55	2646
.338 Win Mag	29.90	13.75	2705
.378 Weatherby Mag	60.68	19.38	3040

Ft, foot; *lbs*, pounds; *sec*, second.

physical therapists and surgeons would not allow patients to go to a range to actually shoot a rifle that soon after surgery, these data are interesting and provides insight into the speed of recovery in select patients. Further investigation is needed.

Although this study helps delineate the return to shooting with the M4 rifle, which is equivalent to a .223 caliber rifle, it remains unclear how well this correlates to other shoulder-fire weapons. In regards to rifle recoil, the M4 is relatively light in both force and velocity compared to many other shoulder-fired weapons used for hunting and recreation. It has been shown that approximately 70% of the rifle's recoil is transmitted through the shoulder, with the remaining force distributed through the grip, cheek, and forestock.[4] The elements of recoil consist of both the force which it produces (measured in foot-pounds) and the velocity (measured in feet per second). Therefore, recoil is a function of weapon weight, powder load, bullet weight, and cartridge design. When compared to many hunting rifles, the M4 often produces 3 to 4 times less recoil energy and typically about half of the recoil velocity (Table IV).[8,9] Although we could presume that larger recoil would translate to increased pain and potentially a slower return to shooting, this would require further studies to confirm this.

Furthermore, in addition to recoil, the other key variable required for successful return to shooting is the ability to generate adequate rifle stability. This has been studied in the biathlon shooting population.[11] Rifle stability is achieved through compression of the buttstock against the shoulder while supporting the stock of the rifle with the contralateral arm through isometric elbow flexor contraction and shoulder forward elevation. Therefore, the dynamic task of rifle shooting involves a coordinated effort of the operative and nonoperative shoulder following shoulder surgery.

Limitations of the study include its retrospective design. In addition, the study was limited by the inherent weaknesses in self-reporting return to duty.[15] We acknowledge that asking patients whether they can shoot a rifle is distinctly different than the patient actually shooting a rifle on a range. However, it would be challenging to objectively assess this task after shoulder surgery in all patients given that rifle ranges are conducted by units during certain training cycles and times during the year. Use of a simulator may be a future area of potential study to assess ability to return to shooting. Lastly, this cohort was composed of active duty military assigned the M4 carbine rifle and may not be generalizable to a civilian population firing other higher caliber rifles. However, we feel these data can be extrapolated to the civilian population as patients commonly recreationally or competitively shoot the AR-15 which is the equivalent rifle to the M4 carbine.

Strengths of the study include the detailed collection of both preoperative and postoperative legacy patient-reported outcome measures at multiple time points to develop an accurate speed and trajectory of recovery. Additionally, the collection of the ability to return to shooting a rifle starting at multiple postoperative appointments provides valuable data on the speed of recovery.

Conclusion

Patients undergoing arthroscopic and open shoulder surgery have a high rate of return to shooting. Approximately 60% of patients resume shooting at 6 months postoperatively and 85% return at 1 year. Patients undergoing shoulder surgery on the contralateral side of their shooting dominance return to shooting significantly faster than those with shoulder surgery ipsilateral to their shooting dominance. Additionally, those undergoing arthroscopic posterior shoulder stabilization return to shooting at a slower rate than anterior stabilization surgery.

Acknowledgments

The authors would like to thank Elisabeth Robinson and Christy Woodruff for their assistance with data collection.

Disclaimers:

Funding: No funding was disclosed by the authors.
Conflicts of interest: The authors, their immediate families, and any research foundation with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

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