# A High Percentage of Healthy Volunteers Fail to Pass Criteria-based Return to Sport Testing for Arthroscopic Bankart Repair

Mathew Hargreaves, B.S., Audria Wood, M.P.H., Nick Manfredi, B.S., Dev Dayal, B.S., Jacobi Hudson, B.S., Kaitlin Higgins Pyrz, B.S., Mike Bagwell, P.T., D.P.T., Aaron Casp, M.D., Thomas Evely, D.O., Eugene Brabston, M.D., Kevin Wilk, P.T., D.P.T., and Amit Momaya, M.D.

**Purpose:** To evaluate whether healthy volunteers can pass a previously published criteria-based return to sport (CBRTS) protocol after Bankart repair. **Methods:** This was a prospective evaluation of asymptomatic volunteers conducted in March 2024. This study included 26 volunteers with no history of upper-extremity injury or surgery. Volunteers were assessed according to a published CBRTS protocol: (1) isometric testing of external rotation (ER) and internal rotation (IR) in the supine and prone position assessed by hand—held dynamometry; (2) isokinetic strength testing of ER and IR assessed by isokinetic dynamometry; (3) endurance testing of side lying ER, prone ER, and prone Y test; and (4) functional testing via closed kinetic chain upper extremity (CKCUE) stability test and unilateral shot put test. A limb symmetry index (LSI) and proportion of volunteers who passed each test were calculated. A passing LSI value was defined as LSI within 10% of the contralateral side, except for the shot put test, for which a passing value was defined as $80\% \leq \text{LSI} \leq 110\%$. A passing score for the CKCUE stability test was $\geq$21. **Results:** No individual participant passed all the tests; instead, an individual on average passed 47% of the CBRTS protocol. On average, the proportion of participants who passed isometric testing was 60.6% (range 46.2-69.2). For isokinetic testing, the proportion of participants passing was 41.4% (range 30.8-57.7). For endurance testing, the proportion of participants passing was 23.1% (range 19.2-30.8). Lastly, 50% of participants passed the CKCUE stability test, whereas 96.2% passed the unilateral shot put test. A nondominant arm deficit was apparent in 4 of the 12 bilateral arm tests. **Conclusions:** This study shows that a high percentage of healthy individuals are unable to pass many of the post-Bankart repair CBRTS protocol tests. Specifically, no participant passed all the tests and individuals only passed 47% of the tests on average. **Level of Evidence:** Level III, prospective single-cohort study.

Traumatic shoulder instability arises with an incidence of 1.7% among a general cohort.[1] When shoulder instability is managed nonoperatively, recurrence rates are estimated between 38% and 80% and are even greater among first-time dislocators who are young and male (86.7%).[1] Although Bankart surgery has shown to reduce recurrent instability, recurrence rates after Bankart surgery continue to remain variable, ranging from 3% to 23%.[2,3] One variable that may affect recurrence rates after Bankart surgery is return to sport (RTS) timing. Returning to play before a full recovery may lead to greater rates of recurrence.[4,5] This highlights the need for further investigation of the current RTS criteria.

There is significant variability in rehabilitation protocols. In 2010, the American Society of Shoulder and Elbow Therapists (ASSET) provided generalized guidelines for 3 phases of recovery but did not outline the exact mechanism to achieve such goals.[6,7] This created a void for instruction that numerous programs have tried to fill. In the years that followed, systematic reviews identified consensus with the ASSET objectives

*From the Medical College of Wisconsin, Milwaukee, Wisconsin, U.S.A. (M.H.); Department of Orthopaedic Surgery, University of Alabama at Birmingham, Birmingham, U.S.A. (A.W., D.D., J.H., A.C., T.E., E.B., A.M.); Medical College of Georgia, Augusta University, Augusta, Georgia, U.S.A. (N.M.); Augusta University/University of Georgia Medical Partnership, Athens, Georgia, U.S.A. (K.H.P.); and Champion Sports Medicine, Birmingham, Alabama, U.S.A. (M.B., K.W.).*

*Received September 3, 2024; accepted January 22, 2025.*

*Address correspondence to Amit Momaya, MD, Department of Orthopaedic Surgery, University of Alabama at Birmingham, 1313 13th Str. South, Suite 207, Birmingham, AL 35205, U.S.A. E-mail: amit.momaya@gmail.com*



*0749-8063/241394/$36.00*
*https://doi.org/10.1016/j.arthro.2025.01.047*

but with a wide variability in the executed exercises and the timing of milestones.[8] Specifically, 75% of studies used time from surgery as the sole criterion for RTS, whereas debate still surrounds range-of-motion and strength progression goals.[4,9] Despite attempts for international consensus, variability in protocol persists, often leaving the decision to surgeon discretion over standardized objective protocols.[10,11]

Recent publications have promoted objective criteria-based return to sport (CBRTS) protocols. Drummond et al.[2] in 2021 adapted the protocol described by Wilson et al.[3] in 2020 to define CBRTS testing. Patients who underwent CBRTS had a lower rate of recurrent instability compared with a historical control group (5% vs 22%; odds ratio 4.85, $P < .001$). Similar evidence-based protocols have been developed for RTS after anterior cruciate ligament (ACL) injuries. These protocols have been more widely studied, and it has been shown that a minority of healthy athletes exhibit limb asymmetry ≤10% on RTS testing. This suggests that baseline asymmetry may exist and highlights that the limb symmetry index (LSI), when used in isolation as a criteria for passing CBRTS, should be further investigated.[12-15]

This study aimed to evaluate whether healthy volunteers can pass a previously published CBRTS protocol after Bankart repair. We hypothesized that a large proportion of healthy participants would fail the CBRTS protocol.

## Methods

This study received institutional review board approval (300011359-004). Our investigation adapted the CBRTS protocol proposed by Drummond et al in 2021.[2] This was a single-institution prospective single-cohort study approved by the university institutional review board.

Healthy, uninjured volunteers were recruited from advertisements and word of mouth at the university campus and the surrounding community. Exclusion criteria were younger than 18 years of age, history of previous upper-extremity injury (e.g., subluxation, fractures, sprains, strains), and any current disability or discomfort prohibiting movement or strength of upper extremities. A previous history of years of overhead activity and type of sporting activity was recorded along with general demographic data. Participants were then asked to complete the 4 testing segments as described to follow.

### Isometric Testing

Hand-held dynamometry (HHD) was used to assess the strength of external and internal rotators. Figure 1 is shown for reference. The participant laid supine with their arm at 0° of humeral abduction. A towel wedge was used in some instances to keep the arm in line with the thorax. The HHD was placed at the distal forearm near the wrist. The participant was instructed to push against the HHD with maximal force for 5 seconds while the HHD was held in place by the investigator; this created a “make-test” procedure for isometric muscle testing. This trial was repeated 3 times for internal rotation (IR) and 3 times for external rotation (ER). The participant was given 30 seconds of rest between reps. Isometric testing at 0° was then repeated for the other upper extremity.

A similar procedure was repeated with the participant lying supine with their arm at 90° of humeral abduction. The HHD was positioned the same. As the participant pushed for 5 seconds, the investigator matched the level of force to create the “make-test” procedure for isometric muscle testing. The trial was repeated 3 times for IR and 3 times for ER. The participant was given 30 seconds of rest between reps. Isometric testing at 90° was then repeated for the other upper extremity. The strength measured by the HHD during each isometric test attempt was recorded.

### Isokinetic Strength Testing

All participants completed a strength testing protocol of isokinetic testing at 2 speeds (60°/s and 180°/s), maintained by an isokinetic dynamometer (Biodex, NY). Participants were positioned at a modified neutral in the scapular plane (i.e., approximately 30° abduction and 30° flexion at neutral ER and IR) with range of motion limited to 5° less than maximum in each direction throughout the experiment. Figure 2 is shown for reference. The participant completed a practice attempt of 5 repetitions through the range of motion at 60°/s. After a minute of rest, participants completed 5 repetitions as quickly as possible with maximum effort in both external and internal directions at 60°/s. Participants were allowed 1 minute of rest before performing at 180°/s. The practice attempt and experimental attempts at 180°/s were then completed in the same manner as before with 10 repetitions instead of 5. The procedure was repeated at 60°/s and 180°/s for the other extremity.[2,3] The force of each attempt was recorded.

### Endurance/Failure Testing

All participants completed a (a) side-lying ER at 0°, (b) a prone ER at 90°, and (c) prone Y test on both upper extremities. Positioning and resistance are outlined below. Figure 3 is shown for reference. The experimental trial asked participants to complete as many repetitions as possible at a constant speed through their full range of motion until they showed signs of fatigue. The investigator or participant stopped the attempt at any of the following signs of fatigue: decreased range of motion, change or compensation in muscle groups, and inability to maintain consistent

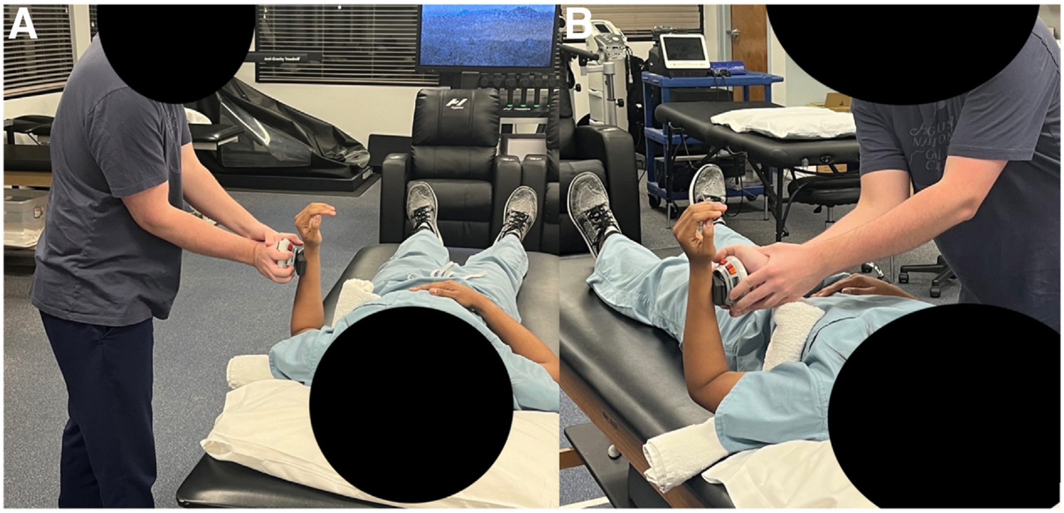

**Fig 1.** Hand-held dynamometer is placed at the distal wrist for external (A) and internal (B) rotation as the investigator applies counter force for the “make-test” procedure for isometric muscle testing.

speed. At this time, the number of complete repetitions was recorded. The test was then repeated on the alternate upper extremity.

(a) For the side-lying ER at 0°, the participant was placed on their side with a towel rolled under their arm. Participants were given a weight 5% of their body weight to provide resistance against ER.

(b) For the prone ER at 90°, the participant laid prone with the testing arm outstretched 90°, so the elbow and forearm were off the table. A towel was placed under the humerus, and the elbow was bent 90°. A weight approximately 5% of their body weight was provided as resistance against ER.[2,3]

(c) For the prone Y test, the participant was lying prone with the tested shoulder on the edge of the table. The arm was then extended from neutral to approximately 135° overhead with the degree of forward flexion depending on participant range of motion. Participants performed the Y test against resistance equivalent to 2% of their body weight.[16]

### Functional Testing

Participants completed a closed kinetic chain upper extremity stability test (CKCUE) and unilateral shot put test. Figure 4 is shown for reference. The CKCUE consisted of three 15-second trials of alternatingly touching each hand as fast as the participant could. Participants assumed a push-up position with hands placed 36

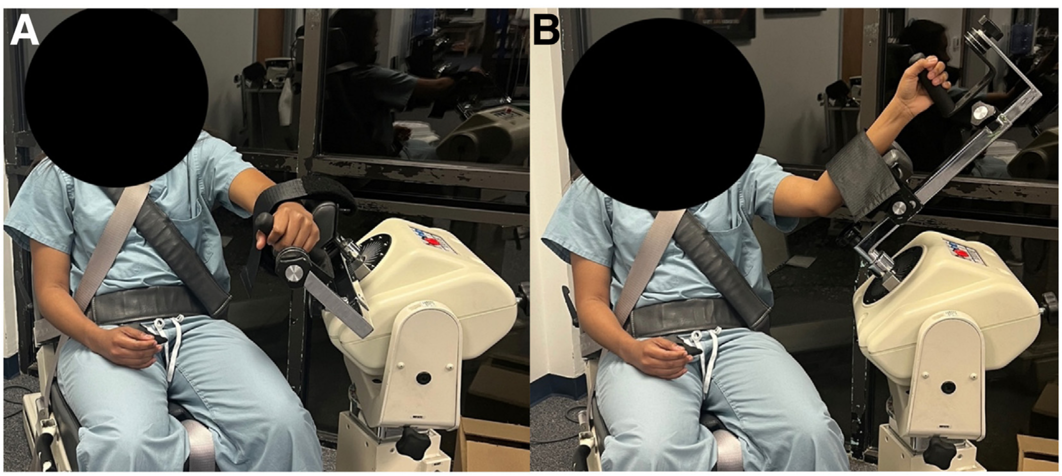

**Fig 2.** The participant is positioned at modified neutral (A) then asked to complete repetitions to approximately 5° less than maximum external rotation (B) and internal rotation (not displayed).

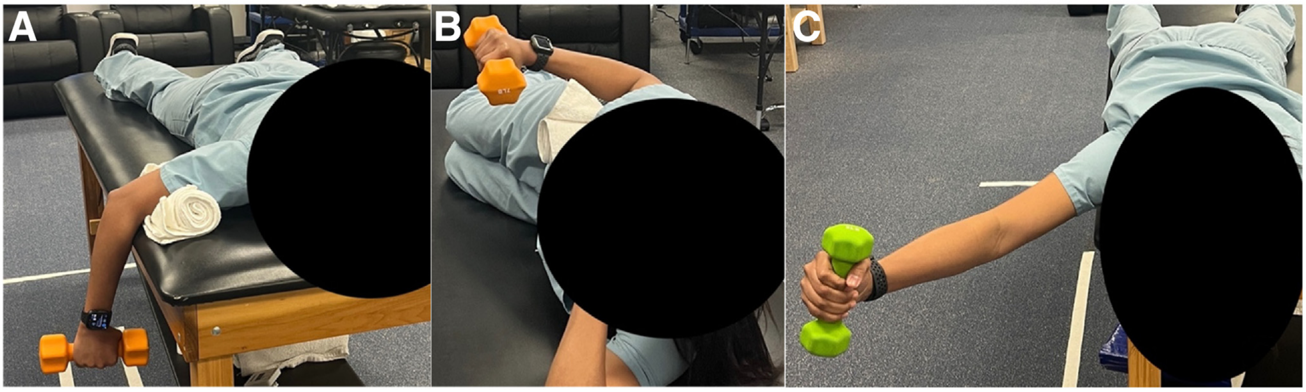


**Fig 3.** Displayed is a participant completing the endurance testing: prone external rotation at 90° (A); side-lying external rotation at 0° (B); and prone Y test (C).

inches apart. Female subjects were given the option to modify to a pushup position on their knees if needed. Forty-five seconds of rest were provided between trials. The number of touches in each trial was counted and recorded.

The unilateral shot put test positioned participants in a seated position with their back against a wall with unrestricted movement on the testing side. Participants pushed a 2.72-kg (6-pound) medicine ball as far as possible while keeping their body in contact with the wall. The distance from the wall to where the medicine ball contacted the floor was measured and recorded. Each arm completed three attempts.

An LSI was calculated for each test. The nondominant extremity was considered the “affected” extremity. As such, the LSI was calculated as the nondominant arm value divided by the dominant arm value for each test. A passing LSI value for all isometric, isokinetic, and endurance tests was defined as LSI within an acceptable margin of 10% of the contralateral side. For the shot put test, the passing value was expanded to allow an additional 10% deficit in the nondominant arm, otherwise stated as an acceptable margin of 80% $\leq$ LSI $\leq$ 110%.[2,3,17] A passing score for the CKCUE stability test was defined as a score greater than or equal to 21.[2] For each test, the proportion of participants that passed was calculated.

## Results

Twenty-six healthy volunteers with no history of upper-extremity injury completed the CBRTS protocol. There were 14 (54%) male volunteers and 12 (46%) female volunteers. The average age was 24.8 years old (range 23-35 years; standard deviation 2.5). The participants were largely right-hand dominant (n = 22). All 26 participants had previous experience competing in athletics at a high school or collegiate level. Sports most

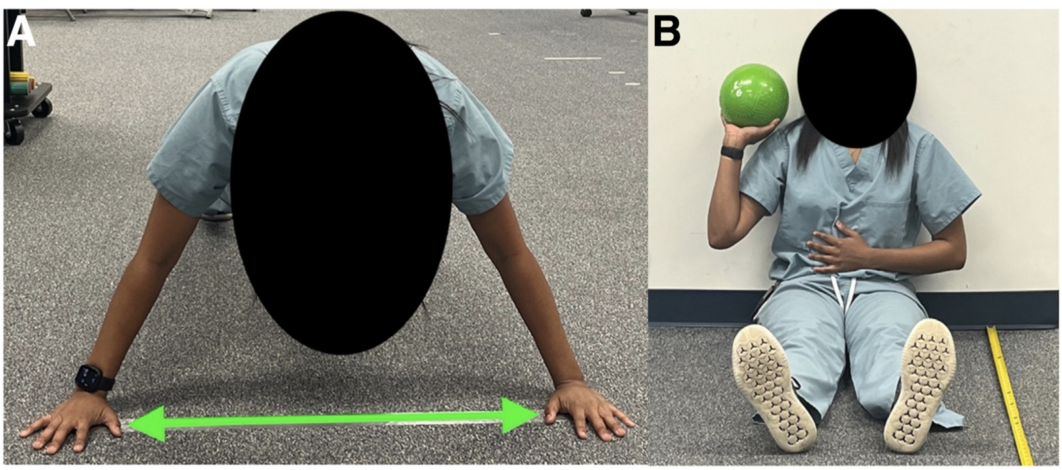


**Fig 4.** For the closed kinetic chain upper-extremity test (A), participants assumed the push-up position with hands 3 feet apart then alternated hand taps with hands following the green arrows. For the shot put test, participants sat with their back against the wall to throw the medicine ball along a tape measure (B).

commonly played included baseball (2), basketball (4), soccer (4), track (3), dance (3), football (4), and other sports like cheer, figure skating, and archery (total, 6). Additional demographic information is listed in Table 1.

For isometric testing, an average of 60.6% (range 46.2-69.2) of participants met the passing definition. The test with the lowest passing rate was prone ER, with a passing rate of 46.2%. For isokinetic testing, an average of 41.4% (range, 30.8-57.7) of participants met the passing definition. The test with the lowest proportion passing was IR 180 °/s (30.8%). For endurance testing, an average of 23.1% (range 19.2-30.8) of participants met the passing definition. The side lying ER and prone ER tests both yielded the lowest passing rates (19.2%).

For the functional testing, 96.2% passed the shot put benchmark and 50% of participants passed the CKCUE benchmark. No individual participant passed all the tests; instead, an individual on average passed 47% of the tests. A nondominant arm deficit was apparent in 4 of the 12 tests that involved bilateral testing. A summary of these findings is displayed in Table 2.

## Discussion

The most important finding of this study was that a high percentage of healthy individuals are unable to pass many of the post-Bankart repair CBRTS protocol tests. Specifically, no participant passed all the tests, and individuals only passed 47% of the tests on average. These findings were in line with our hypothesis. Therefore, the post-Bankart repair CBRTS protocol may need further investigation.

RTS criteria have been studied extensively in the context of ACLR. Athletes and healthy nonathletes alike continue to struggle with passing the ACL reconstruction RTS criteria.[12-15] One study observed that only 24% of uninjured athletes performed sufficiently to meet symmetry thresholds.[15] Similarly, our current study also shows that a large proportion of healthy participants do not pass CBRTS designed for arthroscopic Bankart repair.

Criteria for RTS after Bankart repair remains quite variable. Traditionally, RTS is at the discretion of the provider. A systematic review reported 85% of Bankart rehabilitative articles used time as the sole criteria.

**Table 1.** Participant Demographics

| Number of participants | 26 |
|---|---|
| Male sex, n (%) | 14 (53.8) |
| Female sex, n (%) | 12 (46.2) |
| Age, yr (SD) | 24.8 (2.50) |
| Weight, lb (SD) | 163.0 (30.5) |
| Dominant arm R, n (%) | 22 (84.6) |
| Dominant arm L, n (%) | 2 (7.7) |
| No dominance, n (%) | 2 (7.7) |

L, left; R, right; SD, standard deviation.

Recommendations ranged from 1.5 to 12 months, but most (52%) identified 6 months as the benchmark.[4,5] Unfortunately, this strategy may contribute to greater rates of recurrence, suggesting more objective data are needed to help guide RTS.[4,5] The CBRTS under investigation offers objective criteria for RTS, reducing the rate of recurrent instability from 22% to 5%.[2,3] Similarly, a retrospective cohort study employed methodologies from ACL reconstruction protocols to develop their own functional RTS assessment requirements after arthroscopic Bankart repair. The functional RTS assessment requirements yielded a 6.5% recurrence rate across a 2-year follow-up period. This too is an improvement compared with historical averages.[18]

However, there is caution when selecting criteria to RTS. Studies have observed that the proportion of individuals that can pass a RTS test battery decreases with each additional test.[15,19,20] Although some individual tests had passing rates as high as 96.2%, no individual in our study passed the entire CBRTS protocol. For instance, some of the rehabilitative protocols use physically demanding tasks that may be difficult for patients at baseline.[18] This would be of concern among lower-extremity athletes who are at lower risk for recurrent shoulder instability, and even more so in nonathletes or older patients. Studies have also suggested that baseline asymmetry may exist. This limits the use of LSI as a criteria for passing CBRTS.[12-15] This also highlights the utility of conducting baseline testing, as it may be helpful to compare the affected extremity postoperatively to preinjury function for each individual as opposed to the contralateral arm.

It should also be noted that despite the average LSI falling within 10% or less for most of the tests, most tests had a high rate of failure by individual participants. This apparent discrepancy is explained by the fact that most tests did not show nondominant arm deficits. That is, in many tests, some individuals had better performance on the dominant arm whereas others showed better performance on the nondominant arm. This led to overall average LSI values that were within acceptable range but high individual failure rates.

Augmenting RTS protocols with nonphysical criteria may also help guide decision making. Previous ACLR and Bankart investigations have shown compelling evidence of psychosocial and environmental factors affecting the recovery and RTS process. Recognition of this concept reached a unanimous consensus at an international level.[11] Rossi et al.[21] 2021 noted 74% of athletes failed to RTS for reasons independent of shoulder function, citing kinesiophobia, low confidence, and rehabilitation concerns. Tjong et al.[22] 2015 first identified kinesiophobia, alteration in motivation, mood, and social support to instruct the RTS decision making. In 2018, Gerometta et al.[23] proposed the Shoulder Instability-Return to Sport after Injury, a

**Table 2.** Healthy Volunteer Performance of Post-Bankart Repair Criteria-based RTS Protocol

| Isometric Testing | Proportion Passing LSI ≥90, ≤110 (% of all participants) Total | Male | Female | Average LSI (SD) | Average Nondominant Arm Deficit (%) |
|---|---|---|---|---|---|
| Supine ER | 18 (69.2) | 8 (30.8) | 10 (38.5) | 97.9 (10.3) | 2.1 ($P = .29$) |
| Supine IR | 15 (57.7) | 8 (30.8) | 7 (26.9) | 98.0 (15.4) | 2.0 ($P = .15$) |
| Prone ER | 12 (46.2) | 5 (19.2) | 7 (26.9) | 88.8 (12.0) | 11.2 ($P < .01$) |
| Prone IR | 18 (69.2) | 9 (34.6) | 9 (34.6) | 96.8 (9.2) | 3.2 ($P = .08$) |
| Isokinetic Testing | Proportion Passing LSI ≥90, ≤110 (% of all participants) | | | Average LSI (SD) | Average Nondominant Arm Deficit (%) |
| ER 60 °/s | 11 (42.3) | 9 (34.6) | 2 (7.7) | 101.5 (21.2) | −1.5 ($P = .98$) |
| IR 60 °/s | 9 (34.6) | 5 (19.2) | 4 (15.4) | 95.3 (22.7) | 4.7 ($P = .03$) |
| ER 180 °/s | 15 (57.7) | 8 (30.8) | 7 (26.9) | 101.3 (14.6) | −1.3 ($P = .97$) |
| IR 180 °/s | 8 (30.8) | 4 (15.4) | 4 (15.4) | 99.0 (23.1) | 1.0 ($P = .31$) |
| Endurance Testing | Proportion Passing LSI ≥90, ≤110 (% of all participants) | | | Average LSI (SD) | Average Nondominant Arm Deficit (%) |
| Side-lying ER | 5 (19.2) | 5 (19.2) | 0 (0) | 91.1 (39.1) | 8.9 ($P = .01$) |
| Prone ER | 5 (19.2) | 3 (11.5) | 2 (7.7) | 93.9 (43.6) | 6.1 ($P = .17$) |
| Prone Y | 8 (30.8) | 5 (19.2) | 3 (11.5) | 98.7 (35.8) | 1.3 ($P = .96$) |
| Functional Testing | Proportion Passing LSI ≥80, ≤110 (% of all participants) | | | Average LSI (SD) | Average Nondominant Arm Deficit (%) |
| Shot put | 25 (96.2) | 13 (50.0) | 12 (46.2) | 93.6 (6.9) | 6.4 ($P < .01$) |
| Functional testing | Proportion Passing CKCUE ≥21 (% of all participants) | | | Average LSI (SD) | |
| CKCUE | 13 (50.0) | 11 (42.3) | 2 (7.7) | 21.2 (6.6) | |

CKCUE, Closed Kinetic Chain Upper Extremity Test; ER, external rotation; IR, internal rotation; LSI, limb symmetry index; RTS, return to sport; SD, standard deviation.

validated shoulder-specific assessment of psychological readiness akin to the Anterior Cruciate Ligament-Return to Sport after Injury.[5] A multifactorial approach to recovery after a Bankart repair could aid in RTS decision making. This approach may need to be catered to the individual needs of the patient. For example, collision, overhead, and competition status were associated with different outcomes among athletes in a systematic review investigating the rate of RTS after Bankart repair.[24] Rossi et al.[5] 2022 adjusted their criteria to account for baseline physical activity. Additional strength requirements were added for those who regularly lifted weights and would need to sustain collisions.

Although our study showed that healthy individuals have difficulty passing CBRTS testing, it may actually be important for post Bankart repair patients to meet this 10% threshold to reduce recurrent instability despite the presence of normative baseline asymmetry. Future investigations are needed to evaluate whether baseline limb asymmetry in healthy individuals is predictor of shoulder instability. Furthermore, although the 10% threshold for passing is rather arbitrary, it is determined on the basis of previously published studies.[2] Future investigation of this threshold is needed as this number may need to be revised, especially in overhead athletes.

### Limitations

This study is not without limitations. Baseline physical activity levels of participants were not collected, which may influence results. In addition, these participants did not go through any physical therapy protocol in the months preceding testing. Focused physical therapy in the preceding months may allow an individual to erase baseline deficits. Lastly, the psychosocial context of which injured participants perform could not be replicated among healthy, uninjured volunteers. There was no competitive or intrinsic motivation to RTS.

## Conclusions

This study shows that a high percentage of healthy individuals are unable to pass many of the post-Bankart repair CBRTS protocol tests. Specifically, no participant passed all the tests, and individuals only passed 47% of the tests on average.

## Disclosures

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: E.B. reports board membership with Elton Bryson Stephens Company (EBSCO); and consulting or advisory for Link Orthopaedics Pty Ltd and Orthopaedic Design NA. A.C.

reports consulting or advisory for Arthrex and board or committee member for the American Orthopaedic Society for Sports Medicine. A.M. reports consulting or advisory for Arthrex, CONMED Linvatec, and Miach Orthopaedics; board membership with *Arthroscopy*; and equity or stocks with Reparel. K.W. reports publishing royalties, financial, or material support from Churchill Livingstone CV MosbySlack Publishing; paid consultant for Blazepod and Lite Cure Laser; unpaid consultant for AlterG and Performance health; and financial/material support from Bauerfeind Brace, ERMI Devices. All other authors (M.H., A.W., N.M., D.D., J.H., K.H.P., M.B., T.E.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References


1. White AE, Patel NK, Hadley CJ, Dodson CC. An Algorithmic approach to the management of shoulder instability. *JAAOS Glob Res Rev* 2019;3:e19.00168.
2. Drummond Junior M, Popchak A, Wilson K, Kane G, Lin A. Criteria-based return-to-sport testing is associated with lower recurrence rates following arthroscopic Bankart repair. *J Shoulder Elbow Surg* 2021;30:S14-S20.
3. Wilson KW, Popchak A, Li RT, Kane G, Lin A. Return to sport testing at 6 months after arthroscopic shoulder stabilization reveals residual strength and functional deficits. *J Shoulder Elbow Surg* 2020;29:S107-S114.
4. Ciccotti MC, Syed U, Hoffman R, Abboud JA, Ciccotti MG, Freedman KB. Return to play criteria following surgical stabilization for traumatic anterior shoulder instability: A systematic review. *Arthroscopy* 2018;34:903-913.
5. Rossi LA, Pasqualini I, Tanoira I, Ranalletta M. Factors that influence the return to sport after arthroscopic Bankart repair for glenohumeral instability. *Open Access J Sports Med* 2022;13:35-40.
6. Gaunt BW, Shaffer MA, Sauers EL, Michener LA, McCluskey GM, Thigpen CA. The American Society of Shoulder and Elbow Therapists' Consensus Rehabilitation Guideline for arthroscopic anterior capsulolabral repair of the shoulder. *J Orthop Sports Phys Ther* 2010;40:155-168.
7. Ma R, Brimmo OA, Li X, Colbert L. Current concepts in rehabilitation for traumatic anterior shoulder instability. *Curr Rev Musculoskelet Med* 2017;10:499-506.
8. DeFroda SF, Mehta N, Owens BD. Physical therapy protocols for arthroscopic Bankart repair. *Sports Health Multidiscip Approach* 2018;10:250-258.
9. McIsaac W, Lalani A, Silveira A, Chepeha J, Luciak-Corea C, Beaupre L. Rehabilitation after arthroscopic Bankart repair: A systematic scoping review identifying important evidence gaps. *Physiotherapy* 2022;114:68-76.
10. Kim K, Saper MG. Postoperative management following arthroscopic Bankart repair in adolescents and young adults: A systematic review. *Arthrosc Sports Med Rehabil* 2020;2:e839-e845.
11. Matache BA, Hurley ET, Wong I, et al. Anterior shoulder instability part III—revision surgery, rehabilitation and return to play, and clinical follow-Up—an international consensus statement. *Arthroscopy* 2022;38:234-242.e6.
12. Fältström A, Hägglund M, Kvist J. Functional performance among active female soccer players after unilateral primary anterior cruciate ligament reconstruction compared with knee-healthy controls. *Am J Sports Med* 2017;45:377-385.
13. Greenberg EM, Dyke J, Leung A, Karl M, Lawrence JT, Ganley T. Uninjured youth athlete performance on single-leg hop testing: How many can achieve recommended return-to-sport criterion? *Sports Health Multidiscip Approach* 2020;12:552-558.
14. Magill JR, Myers HS, Lentz TA, et al. Healthy pediatric athletes have significant baseline limb asymmetries on common return-to-sport physical performance tests. *Orthop J Sports Med* 2021;9:232596712098230.
15. Markström JL, Naili JE, Häger CK. A minority of athletes pass symmetry criteria in a series of hop and strength tests irrespective of having an ACL reconstructed knee or being noninjured. *Sports Health Multidiscip Approach* 2023;15:45-51.
16. Otley T, Myers H, Lau BC, Taylor DC. Return to sport after shoulder stabilization procedures: A criteria-based testing continuum to guide rehabilitation and inform return-to-play decision making. *Arthrosc Sports Med Rehabil* 2022;4:e237-e246.
17. Chmielewski TL, Martin C, Lentz TA, et al. Normalization considerations for using the unilateral seated shot put test in rehabilitation. *J Orthop Sports Phys Ther* 2014;44:518-524.
18. Kelley TD, Clegg S, Rodenhouse P, Hinz J, Busconi BD. Functional rehabilitation and return to play after arthroscopic surgical stabilization for anterior shoulder instability. *Sports Health Multidiscip Approach* 2022;14:733-739.
19. Gokeler A, Welling W, Zaffagnini S, Seil R, Padua D. Development of a test battery to enhance safe return to sports after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc* 2017;25:192-199.
20. Herbst E, Hoser C, Hildebrandt C, et al. Functional assessments for decision-making regarding return to sports following ACL reconstruction. Part II: Clinical application of a new test battery. *Knee Surg Sports Traumatol Arthrosc* 2015;23:1283-1291.
21. Rossi LA, Tanoira I, Brandariz R, Pasqualini I, Ranalletta M. Reasons why athletes do not return to sports after arthroscopic Bankart repair: A comparative study of 208 athletes with minimum 2-year follow-up. *Orthop J Sports Med* 2021;9:232596712110133.
22. Tjong VK, Devitt BM, Murnaghan ML, Ogilvie-Harris DJ, Theodoropoulos JS. A qualitative investigation of return to sport after arthroscopic Bankart repair: Beyond stability. *Am J Sports Med* 2015;43:2005-2011.
23. Gerometta A, Klouche S, Herman S, Lefevre N, Bohu Y. The Shoulder Instability-Return to Sport after Injury (SIRSI): A valid and reproducible scale to quantify psychological readiness to return to sport after traumatic shoulder instability. *Knee Surg Sports Traumatol Arthrosc* 2018;26:203-211.
24. Memon M, Kay J, Cadet ER, Shahsavar S, Simunovic N, Ayeni OR. Return to sport following arthroscopic Bankart repair: A systematic review. *J Shoulder Elbow Surg* 2018;27:1342-1347.