Rehabilitation and Return to Sport following Operative and Nonoperative Treatment of Anterior Shoulder Instability

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KEYWORDS

- Anterior shoulder instability • Postoperative rehabilitation • Return to sport criteria

KEY POINTS

- Regardless of the treatment intervention employed, rehabilitation following anterior shoulder instability should focus on the preservation of motion and strengthening.
- Rehabilitation interventions differ slightly based on the operative intervention that was performed.
- A well-informed, shared return to sport (RTS) decision after anterior shoulder instability should involve an assessment of an athlete's pain levels and tolerance, psychological readiness for RTS, shoulder range of motion, strength, sport-specific power and endurance, and functional assessments that incorporate necessary components of the kinetic chain.

INTRODUCTION

Anterior glenohumeral instability is common among young athletes and typically presents following a traumatic injury.[1,2] Although anterior shoulder instability can be treated nonoperatively, current literature suggests operative management may result in lower recurrent rates compared to nonoperative treatment.[3] Operative treatment options include open or arthroscopic Bankart repair, remplissage, Latarjet, and other bone block augmentation procedures.[4] As no consensus on how to optimize outcomes following surgery and rehabilitation has been established, there has been growing interest in the rehabilitation process and timing of returning an athlete to sport following these management options for anterior shoulder instability. The purpose of

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this article is to review the current rehabilitation and return to sport (RTS) protocols for various nonoperative and operative management strategies following anterior shoulder instability events.

NONOPERATIVE MANAGEMENT

The best course of management for patients following primary traumatic anterior shoulder dislocation is up for debate. A Cochrane systematic review[5] suggests that surgical management should be the first choice for younger male individuals participating in activities that place high demands on the shoulder complex, while another showed moderate-quality evidence that nearly half of patients were able to avoid recurrence with nonoperative management after anterior glenohumeral joint dislocation.[6]

Regardless, if a shared decision-making process results in the choice of nonoperative management, immobilization in a standard sling should be limited to 1 week and weaning should be encouraged as the patient becomes more comfortable.[7] Short-term immobilization can limit decreases in strength and motor control related to disuse. Sling positioning in external rotation (ER) and increased duration of sling use have not been shown to decrease recurrence rates.[8,9] To date, no evidence suggests a role for corticosteroids or orthobiologics in the management of primary anterior glenohumeral dislocation.

During the first 10 to 14 days of conservative management following primary traumatic anterior shoulder dislocation, rehabilitation should emphasize the restoration of range of motion (ROM), early activation of the rotator cuff and scapular muscles through submaximal contractions, and activities to address proprioception and motor control.[10] Isometric contractions may be emphasized in this phase. Psychological risk factors and kinesiophobia should also be addressed with patient education encouraging active movement and use of the injured shoulder for daily activities as symptoms and comfort allow. Referrals for mental health care should be made when deemed appropriate to help avoid protracted recovery times. Social support from rehabilitation professionals has been identified as an important contributor to increased patient satisfaction and decreased depression postinjury.[11]

As pain and inflammation subside after the initial postinjury phase, a progressive neuromuscular strengthening program incorporating the kinetic chain and plyometric activity as appropriate should be initiated. Interventions should be matched to the patient's irritability level and activity demands. A staged approach for rehabilitation classification based on irritability levels has been previously described and can be useful to guide progression for these patients.[12] Strengthening and controlled active ROM should be gradually progressed in position from at the side, to mid-ROM, and eventually into provocative end-range positions under progressively increased loads that are specific to the demands of a patient's desired activities. In general, rehabilitation programs incorporating neuromuscular control and the kinetic chain have demonstrated superior patient outcomes when compared to strengthening alone for those recovering from shoulder instability.[10,13,14] A description of general phased rehabilitation approach with general timelines and overarching objectives is provided in **Table 1**. A corresponding detailed rehabilitation progression is provided in Appendix 1. It should be emphasized that these phases are not mutually exclusive and patients will often progress in a nonlinear manner and at differing rates. For example, a patient may be progressing through midrange strengthening activities and have periods of higher tissue irritability levels and require more controlled ROM activities along with submaximal isometrics to allow symptoms to subside.

Table 1
Phased approach to rehabilitation for shoulder instability

	Weeks 0–6	Weeks 6–8	Weeks 8–10	Weeks 10–12	Weeks >12
		Staged Recovery of ROM (II)			
	Tissue Protection (I)		Period of Strengthening (III)		Functional Optimization (IV)
Symptom modulation	✓				
Motor control		✓	✓	✓	
Activation		✓	✓	✓	
Acquisition			✓	✓	
Assimilation				✓	
Functional optimization					✓

Return to Sport and the Rehabilitation Setting

There is no current consensus on timing or criteria for RTS decision-making after an anterior shoulder instability event. Specific rehabilitation endpoints may vary greatly by sport, and many functional tests, though widely used, have not been fully explored in the literature. A 2022 evidence-based Consensus statement on shoulder injury provides an overview of 6 domains that should be considered when making RTS decisions.[15] These domains include (1) pain, (2) active shoulder ROM, (3) strength, power, and endurance, (4) the kinetic chain, (5) psychological readiness, and (6) sport-specific activities. Pain levels can be assessed via self-report with measures such as the numeric pain rating scale (ie, 0–10 rating indicating no pain to extreme pain).[16] There is some debate regarding whether an athlete should be pain free prior to a return to previous performance levels, as there is likely to be situations in which this will be unavoidable. An assessment of risk and risk tolerance can be utilized if some pain persists with sport participation,[17] and pain that impacts performance should be seriously considered prior to allowing an athlete to return to play. ROM criteria for RTS will vary with sport-specific demands, and in some cases, a loss of ROM may persist but have no impact on an athlete's performance (football linebacker), while for others, return to full ROM is essential (baseball pitcher). In the case of nonoperative management of anterior shoulder instability, there should be a reasonable expectation for the athlete to achieve full, preinjury ROM of the involved shoulder due to the lack of expected postoperative changes. Strength, power, and endurance testing needs may differ by sport. Broadly, minimum strength recommendations are to aim for 10% increased rotator cuff strength on the dominant arm compared to the nondominant and an external/internal rotation strength ratio of at least 65% (measured isokinetically), but up to 100% (if measured isometrically).[18] A comprehensive RTS decision-making process should also include functional testing that can encompass the above domains of strength, power, and endurance, as well as the kinetic chain and sport-specific activities. Some of the most commonly studied and used functional tests are the closed kinetic chain upper extremity stability test (CKCUEST),[19–21] the single-arm seated shot-put test,[22,23] the athletic shoulder test (ASH),[24–27] and the upper quarter Y-balance test[21,28,29] (**Fig. 1**).

As noted previously, no specific set of criteria for RTS decision-making has been established. Some literature has described potential specific testing batteries to aid RTS decision-making with promising initial results demonstrating validity and

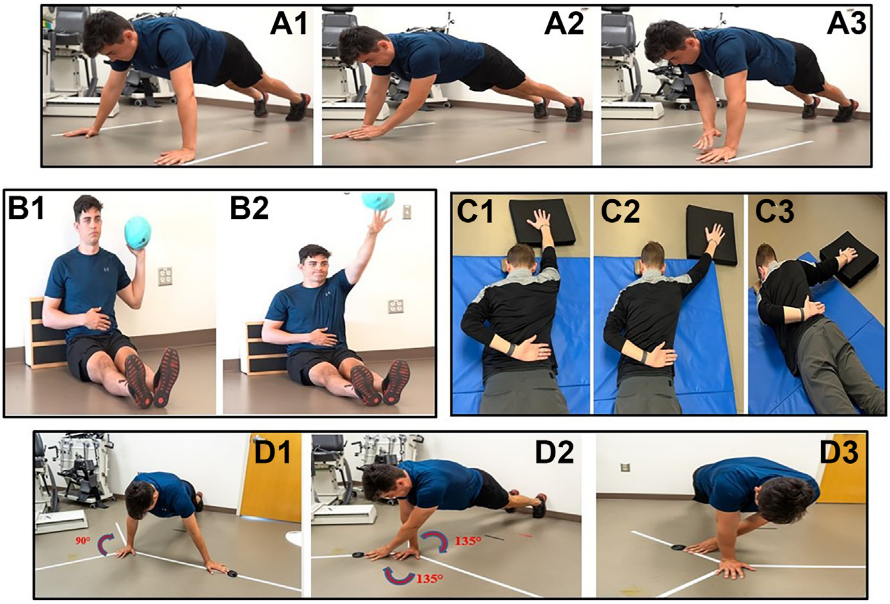

Fig. 1. (*A.1*) CKCUEST starting position; (*A.2*) CKCUEST alternating touch 1; (*A.3*) CKCUEST alternating touch 2; (*B.1*) Single-arm seated shot-put test starting position; (*B.2*) Single-arm seated shot-put test ending position; (*C.1*) ASH test I-position; (*C.2*) ASH test Y-position; (*C.3*) ASH test T-position; (*D.1*) Upper quarter Y-balance test medial reach; (*D.2*) Upper quarter Y-balance test superolateral reach; (*D.3*) Upper quarter Y-balance test inferolateral reach.

decrease recurrence rates,[30,31] while others have provided expert opinion and clinical commentaries on potential testing avenues.[32,33] At a minimum, a well-informed, shared RTS decision after anterior shoulder instability should involve an assessment of an athlete's pain levels and tolerance, psychological readiness for RTS, shoulder ROM, strength, sport-specific power and endurance, and functional assessments that incorporate necessary components of the kinetic chain.

Evidence for RTS outcomes with nonoperative management of anterior shoulder instability suggests a high rate of return to activity, but also a high rate of recurrence and continued symptoms. Buss and colleagues,[34] Tokish and colleagues,[35] and Dickens and colleagues[36] have all illustrated this. Additionally, a recent systematic review demonstrated a high level of RTS (76.5%) across the literature, but with a low-rate (51.5%) of RTS at (or above) the same level as prior to injury.[37] In that review, the overall recurrence rate was 54.7% for the included studies and was higher (78.7%) for collision athletes specifically.[37] Though not exclusively in athletes, a long-term outcomes (median follow-up time = 17 years) study in 2022 found similar results.[38] In this relatively young cohort (median age = 19 years), the recurrence of instability was 37.5% and 58.4% of patients had recurrent pain at some point during clinical follow-up. Further, it is well known that individuals who fail nonoperative management and suffer recurrent instability have higher risk of biomechanical alterations and further injury, including labral tear progression as well as glenoid and humeral bone loss with known risk of increased failures rates following subsequent, standard Bankart repair.[39–41] Lastly, it is imperative to remember that outcomes of successful RTS and recurrent instability are not synonymous, and the decision to RTS should be weighed against the significant risk factors.

ARTHROSCOPIC BANKART REPAIR

Most often, arthroscopic Bankart repair is indicated in cases of capsulolabral injury without significant bone loss following anterior shoulder instability events.[42] Recently, attention has been given to rehabilitation protocols with accelerated, early ROM as multiple studies have supported its use in functional recovery, reduced postoperative pain, and earlier return to activity with no increase in recurrence.[43] A level 1 randomized study by Kim and colleagues[44] reported on the outcomes of 62 patients with shoulder instability, randomizing them into 2 groups: early accelerated rehabilitation versus conventional rehabilitation. The authors concluded that early accelerated rehabilitation does not increase recurrence, with final patient-reported outcomes comparable to conventional rehabilitation.[44]

Rehabilitation following surgical stabilization has been dependent on time frames, with 4 phases making up the rehabilitation protocol.[45] Phase I is dependent on tissue healing and begins immediately after surgery to the first 4 weeks postoperatively. The primary goal is the protection of the surgical repair and ROM. The first 2 weeks should incorporate minimal stress to allow for healing and scar formation.[46] After the first 2 weeks, moderate stresses can be applied to promote tissue remodeling and maturation via a defined, protected ROM protocol. Pendulum exercises, rope/pulley exercises, and wand exercises can be used to obtain reasonable passive range of motion (PROM) and active-assisted range of motion (AAROM) goals of forward flexion (FF) to 90°, ER to 30°, and internal rotation (IR) to 45°.[45] Submaximal isometric strengthening within protected ROM is also incorporated.[45,46]

Phase II begins 4 to 6 weeks postoperatively and involves a gradual increase in ROM, submaximal tissue loading, and dynamic stabilization while continuing to protect the surgical repair and control pain and inflammation. PROM and AAROM with increases in FF, ER, and IR are performed, and active range of motion (AROM) in FF, ER, and IR begins in this phase with the goal of full AROM FF by completion of this phase. Isometric strengthening continues and isotonic strengthening exercises are introduced.[43,45]

The goals of phase III include the preservation of the surgical repair and continued increase in strength, endurance, and neuromuscular proprioception. The athlete should still avoid overhead and contact sports at this time, but activities such as jogging and cycling are allowed.[43] Rehabilitation in this phase focuses on terminal ROM stretching and strengthening exercises with goals of painless shoulder AROM with strength comparable to the uninjured side by phase completion.[43]

The RTS/function phase (phase IV) begins next and requires an athlete to establish and maintain full AROM/PROM while continuing to improve strength, power, and endurance. Throwers should begin a return to throwing program during this phase, and contact athletes should continue to develop strength and neuromuscular proprioception.[43,47] This phase usually continues until 4 to 6 months postoperatively, as these time-based restrictions have been used most commonly to protect before full returning to play.[48,49] However, the effectiveness of time-based clearance methods following surgical stabilization of the shoulder has been questioned, as recurrent instability in athletes after surgical stabilization has been reported as high as 23%,[50] and rates of return to preinjury level have ranged from 50% to 80%.[51,52] While standardized RTS testing has been popularized following anterior cruciate ligament reconstruction, with objective measurements of strength, endurance, and functional testing driving the decision-making process of returning to sport,[53,54] similar methods of assessing appropriate strength and restoration of functional ability for RTS following shoulder stabilization surgery are underdeveloped. In 2020, Wilson and colleagues[55] sought to construct objective criteria for returning to sport following shoulder stabilization surgery. Using a battery of strength and functional testing, the authors found that despite athletes being 6 months from operative intervention, a substantial number did not meet expected objective recovery goals.[55] They concluded that strength and functional testing, rather than arbitrary passage of time, may be better to assess return to play following shoulder stabilization.[55] These objective criteria-based return-to-sport (CBRTS) testing protocols continue to be developed and validated,[56] and most recently, Drummond Junior and colleagues[30] has shown that athletes undergoing CBRTS testing following arthroscopic Bankart repair are less likely to experience recurrent instability than those who are cleared to RTS based on time from surgery alone. These promising results are likely to shape further research on the RTS decision-making paradigm following shoulder stabilization surgery as current evidence suggests that objective CBRTS testing proves superior over time-based clearance in terms of outcomes following RTS after shoulder stabilization.[30] An example of a CBRTS protocol is provided in **Table 2**.

REMPLISSAGE AND OPEN BANKART REPAIR

Rehabilitation following remplissage in accordance with arthroscopic Bankart repair follows a very similar protocol to that described above and RTS results following this combination of procedures has been promising. However, consideration of stress across the healing infraspinatus is recommended. Therefore, rehabilitation following remplissage generally incorporates an approximately 6 week period of limitation with aggressive stretching/tensioning of the infraspinatus and no greater than submaximal activation of the external rotators of the glenohumeral joint. Davis and colleagues[57] found in their 2023 systematic review and meta-analysis that odds of RTS at any level were significantly higher after Bankart repair plus remplissage compared to Latarjet or Bankart repair alone. In addition, open Bankart repair continues to provide surgeons with an option for operatively managing shoulder instability in athletes. In a 2021 systematic review, AlSomali and colleagues[58] found an overall recurrent instability rate of 8.5% and a high RTS rate of 87%. However, special consideration should be given to the open nature of this procedure in the rehabilitation process if a subscapular peel or tenotomy approach is utilized. Caution with passive and active-assisted ER and active IR in the first 4 to 6 weeks postoperatively is suggested due to the healing subscapularis.[43]

LATARJET AND OTHER BONE BLOCK PROCEDURES

The Latarjet and other bone block procedures have been shown to be reliable treatments for patients with recurrent instability, particularly in young athletes with glenoid bone loss.[59–61]

While there is a growing body of studies supporting the efficacy of Latarjet and other bone block procedures, there is no clear consensus on postoperative rehabilitation protocols, with substantial heterogeneity from one provider to another. Many of the existing rehabilitation protocols after bone block procedures have been derived from level IV and V evidence. Beletsky and colleagues[62] reviewed 31 publicly available protocols from both academic orthopedic programs as well as private sports medicine practices and found significant variability between rehabilitation exercise protocols and motion goal recommendations.

In general, rehabilitation after bone block procedures classically consists of 5 phases[63]: (1) protection, (2) active ROM, (3) strengthening, (4) progression to functional training, and (5) sports-specific activities.

Table 2
Criteria-based return to sport testing protocol example

Assessment	Involved	Uninvolved	Pass/Fail Criteria	Results
ROM				
ER @ 90° IR @ 90° Total arc			Fail if: 1) Total ROM difference of >5° 2) IR deficit >15° in involved	
Strength				
Isometric ER @ 0°			Goal: ≥90% of uninvolved with dynamometer	
Isometric IR @ 0°			Goal: ≥90% of uninvolved with dynamometer	
Isometric ER @ 90°			Goal: ≥90% of uninvolved with dynamometer	
Isometric IR @ 90°			Goal: ≥90% of uninvolved with dynamometer	
Isokinetic ER @ 60°/s *if available			Goal: ≥90% of uninvolved with dynamometer	
Isokinetic IR @ 60°/s *if available			Goal: ≥90% of uninvolved with dynamometer	
Isokinetic ER @ 180°/s *if available			Goal: ≥90% of uninvolved with dynamometer	
Isokinetic ER @ 180°/s *if available			Goal: ≥90% of uninvolved with dynamometer	
Functional				
CKCUEST			Goal: ≥21 touches; no apprehension	
Unilateral seated shot-put test			Goal: Involved dominant: 95%–100% of uninvolved Goal: Involved nondominant: 80% of uninvolved	
Upper quarter Y-balance test			Goal: Normalized reach ≥90% of contralateral limb in all directions	
ASH test			Goal: ≥90% net peak force of contralateral limb	
Overall recommendation:			Rationale	

The goals of the protection phase include protecting the bony augmentation and subscapularis repair while optimizing tissue healing, controlling for swelling, and preventing stiffness. The arm is immobilized in a sling for 4 weeks with ER limited to less than 30°. Early PROM exercises are initiated during this time. Scapulothoracic exercises and active ROM of uninvolved joints including the elbow, wrist, and neck are encouraged.

The goals of the AROM phase are to improve active shoulder motion and increase muscular endurance of the shoulder complex. The sling is discontinued at this time, and the patient should have adequate PROM. AAROM exercises are initiated followed by AROM exercises. AROM can be started in supine, side-lying, or prone positions to reduce the effects of gravity, progressing to standing as endurance improves. Isotonic exercises should focus on high-volume training with 15 to 25 repetitions for 2 to 3 sets.

Oftentimes, FF will progress faster than ER, and ER deficits have been shown to persist after Latarjet.[64,65] Given the higher probability of restricted ER, rehabilitation should closely monitor ER ROM progression and address any deficits more aggressively starting at 10 weeks.

The goals of the strengthening phase are to improve muscular strength while challenging neuromuscular control. This begins at around the 10 week postoperative period. Progressive strengthening of the subscapularis, biceps brachii, and pectoralis major and minor muscles is initiated while taking care not to stress the capsule with aggressive overhead activity. Loads that correspond to a repetition range of an 8 to 12 for 3 to 6 sets should be used. Rehabilitation exercises that include kinetic activation in single leg squat, split squat, and half and tall kneeling positions while adding distal resistance should be utilized at the end of this phase.

The goals of the functional training phase are to progress to preinjury levels of function while maximizing power development. This phase begins around the 16 week postoperative period. At this stage, patients can initiate overhead strengthening activities. Plyometric exercises can be used to enhance fast twitch muscle fibers and improve neuromuscular control.

After completion of the prior 4 phases, the athlete has demonstrated enough ROM, neuromuscular control, strength, and power to start a return to play progression. This phase will be dependent on the sport the patient is returning to and consists of sport-specific drills.

However, despite generalized rehabilitation protocols, RTS timing and criteria remain controversial. In a systematic review of 2134 patients spanning 36 studies, Hurley and colleagues[66] reported a wide discrepancy in return to play criteria, with time-based clearance most often utilized (66.7% of studies), followed by computed tomographic imaging (25% of studies), and physical examination (11.1% of studies). Among the studies utilizing time-based clearance for return to play, 3 months was the most commonly used time-point for clearance (35.4% of studies), and average return to play occurred at an average of 5.8 months postoperatively.[66] However, recent studies have called into question the reliability and validity of utilizing time-based clearance or physical examination to determine the readiness for RTS.[30] Similar to the recent trend seen in arthroscopic Bankart repair, surgeons have increasingly used CBRTS testing protocols after bone block augmentation procedures to allow for more critical evaluation of multiple components of functionality, including strength and endurance. Compared to manual muscle testing, isokinetic and isometric dynamometry often used in CBRTS testing have been shown to better assess rotation strength while controlling for positioning, translational stresses, speed, and rotational forces.[67] Furthermore, endurance testing allows for the evaluation of shoulder girdle fatigue, which is often overlooked during physical examination.[56]

Despite the clearance method, multiple systematic reviews have demonstrated good-to-excellent clinical outcomes after bone block procedures, with high rates of RTS ranging from 72% to 96.8% and low recurrent instability rates around 7%.[37,66] More specifically, a systematic review by Hurley and colleagues[66] of 2134 patients found an RTS rate after open Latarjet of 88.2% overall and 90.3% in overhead athletes. Studies have also demonstrated similar RTS outcomes between open and arthroscopic Latarjet.[61] Other bone block procedures including distal tibial allograft and iliac crest autografts were studied in a pooled meta-analysis of 623 patients by Gilat and colleagues,[68] who found an overall RTS rate of 88%. Hurley and colleagues[69] found that common reasons for failure to RTS after Latarjet included persistent pain and apprehension, feeling like it was a natural end to their sports career, and thoughts of having to undergo repeat surgery and rehabilitation.

Assessing Psychological Readiness

Regardless of the management strategy utilized following an anterior shoulder instability event, psychological readiness to RTS should be evaluated prior to clearance. The Shoulder Instability-Return to Sport Index (SIRSI) provides a framework for this evaluation.[70] The SIRSI was adapted from the Anterior Cruciate Ligament-Return to Sport after Injury scale and has been validated as a reproducible scale that identifies patients who are not ready to RTS after an episode of shoulder instability, whether they undergo operative or nonoperative management.[70,71] It is comprised of 12 items, and athletes are asked to answer questions based on a 0 to 10 scale, 0 being "not confident at all," and 10 being "full confident."[70]

Implementing tools such as the SIRSI score have proven beneficial as a psychological assessment of a patient's readiness to RTS following shoulder instability events.[70,72]

Rossi and colleagues[71,73] and Kelley and colleagues[74] found that following arthroscopic Bankart repair, patients who RTS and those who returned to their preinjury sports level were significantly more psychologically ready than those who did not return. Additionally, Hurley and colleagues[69] found that poor psychological readiness was a key factor preventing patients from returning to play after Latarjet. Using the SIRSI scale, these authors found that thoughts of having to repeat surgery and rehabilitation again were significantly associated with decreased RTS.[69] Thus, assessing psychological readiness is a critical piece of the RTS decision-making process following management of anterior shoulder instability and should be addressed during the rehabilitation period.

SUMMARY

As anterior shoulder instability continues to plague athletes, it is imperative to define appropriate rehabilitation protocols that lead to the most successful functional outcomes and RTS. Regardless of the treatment intervention employed, rehabilitation should focus on the preservation of motion and strengthening. When appropriate in the rehabilitation protocol, RTS testing should be criteria based, rather than time based, with a special focus given to psychological readiness in order to promote successful return to athletics and prevention of recurrent instability episodes in the future.

CLINICS CARE POINTS

- Rehabilitation following anterior shoulder instability should focus on recovery of strength and range of motion.
- Rehabilitation should be tailored to the specific surgical intervention performed.
- A well-informed, shared return to sport (RTS) decision should involve assessment of an athlete's pain, psychological readiness to return, shoulder range of motion, sport-specific power/endurance, and functional assessments that incorporate necessary components of the kinetic chain.

DISCLOSURE

A. Lin: Stryker/Tornier: Paid Consultant/IP, Arthrex: Paid Consultant/IP, American Shoulder and Elbow Surgeon: Committee or board member, American Orthopedic Society for Sports Medicine: Committee or board member, ISAKOS: Committee or

board member, Rotator Cuff Study Group: Committee or board member, Knee Surgery, Sports Traumatology, Arthroscopy: Editorial or governing board, JBJS Case Connector: Associate Editor, Arthroscopy: Editorial or governing board, JISAKOS: Editorial or governing board, American Journal of Sports Medicine: Reviewer, Journal of American Academy of Orthopedic Surgeons: Reviewer, Knee Surgery, Sports Traumatology, Arthroscopy: Reviewer, Journal of Shoulder and Elbow Surgery: Reviewer, Journal of Bone and Joint Surgery: Reviewer. No other authors have anything to disclose.

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APPENDIX 1: DETAILED REHABILITATION PROGRESSION

Activity	0–3 wk	3–6 wk	6–9 wk	9–12 wk	12–16 wk	16+ wk
Tissue protection	Sling immobilization for all activities other than physical therapy (PT) exercises Strict protection of • Infraspinatus (arthroscopic Bankart) • Subscapularis (open Bankart and Latarjet)	Only PROM through the beginning of sling discharge Strict protection of • Infraspinatus (arthroscopic Bankart) • Subscapularis (open Bankart and Latarjet)	End of strict tissue protection Stepwise increase in loading of all structures in shoulder	No overpressure to the anterior capsule in the abducted-externally rotated position All mobilizations to occur only with surgeon orders*	NA	NA
ROM	120° maximum PROM flexion 30° maximum PROM ER at ≤20° shoulder abduction	135° (to tolerance) PROM flexion 45° maximum PROM ER at ≤20° shoulder abduction	155° PROM flexion 65° PROM ER at ≤45° shoulder abduction in the scapular plane At 8-wk postop: 45° maximum PROM ER at 90° shoulder abduction in the scapular plane	PROM ER to frontal plane after achieving 90° shoulder abduction in the scapular plane 90° (or available end-range) ER at 90° shoulder abduction frontal plane Goal: ROM within 5° of the contralateral side	Achievement of all ROM goals	NA

(*continued on next page*)

(continued)

Activity	0–3 wk	3–6 wk	6–9 wk	9–12 wk	12–16 wk	16+ wk
Joint mobilizations/ overpressure	Contraindicated	Contraindicated	*At 8 wk postop:* **Only with surgeon orders** If significant deviations from ROM goals and pathologic stiffness present, initiate glenohumeral (GH) mobilizations in 45° of scapular abduction (*distraction, posterior, and inferior glides only*) *Contraindicated in absence of surgeon orders*	**Only with surgeon orders** If significant deviations from ROM goals and pathologic stiffness present, initiate GH mobilizations in 45° of scapular abduction (*distraction, posterior, and inferior glides only*) *Contraindicated in absence of surgeon orders*	*At 12 wk postop:* If significant deviations from ROM goals and pathologic stiffness present, GH mobilizations, beginning in midrange, progressing to end-range/ restricted position (begin *anterior glides*)	As required, no restrictions
Proprioception	Contraindicated	*1–2 wk prior to sling discharge*: (approximately wk 5) Finger-tip pressure rhythmic stabilization; joint positioning; scapular muscle activation *At sling discharge*: Scapular rhythmic stabilization/ isometric holds	Rhythmic stabilization with increasing load during resistance activities	Progress from isolated patterns and progress to complex, multiplanar patterns	*Complex, multiplanar patterns*: Slow reversal-hold relax Protected plyometrics	Unprotected plyometrics

Summary of Rehabilitation Progression (continued)

Strengthening	Contraindicated	AAROM at the beginning of sling discharge AROM at complete sling discharge Finger-tip pressure only No external resistance	AROM progressing to Maximal Isometrics Use of "place and holds" for elevation Rhythmic stabilization with increasing load *Week-8:* start progressive resistance exercises (PREs) pending criteria are achieved (allow free weights) External and internal rotations strengthening before loading in scapular plane abduction *Week-8+*: Weight-bearing exercises	Progress to elastic resistance	Specific, targeted strengthening based on interim strength testing results Progressive strengthening for the rotator cuff, scapular stabilizers, and shoulder girdle muscles	Progressive strengthening activities for the rotator cuff, scapular stabilizers, and shoulder girdle muscles

Summary of Rehabilitation Progression (continued)

Functional training	Contraindicated	Contraindicated	Contraindicated	Contraindicated	Dynamic exercises and power development Closed-kinetic chain over open-kinetic chain exercises	Progression of functional-based and activity-specific exercises

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Activity	0–3 wk	3–6 wk	6–9 wk	9–12 wk	12–16 wk	16+ wk
Plyometrics	Contraindicated	Contraindicated	Contraindicated	Contraindicated	Protected plyometrics: Limit and protect ROM; ROM increasing progression and lessening support of anterior capsule; Progress from general movements to specific movements	Initiate unprotected plyometrics