Rehabilitation Guidelines for SLAP Lesion Repairs

Shoulder Anatomy

The shoulder joint is comprised of many structures. The head of the humerus (arm bone) contacts the concave surface of the glenoid fossa (shoulder blade) to make up the ball and socket structure of the shoulder joint.[1] The glenoid labrum sits between these two bony surfaces and functions to increase the depth of the glenoid fossa, thus improving stability of the shoulder joint.[1] The superior part of the labrum also serves as an attachment point for the long head of the biceps brachii.[2]

Image 1: Anatomy of the shoulder joint

Mechanism of Injury

A superior labral anterior to posterior (SLAP) lesion is an injury to the superior labrum that extends anterior to posterior (the top part of the labrum from front to back).[2] This injury may or may not disrupt the attachment point of the long head of the biceps brachii tendon.[2] This type of labral injury is most commonly seen in individuals participating in overhead sport or labor.[1]

A SLAP lesion can occur from a traumatic event, such as falling on an outstretched hand or a hard pull on the shoulder joint that results in a subluxation or dislocation event.[2] Alternatively, a SLAP lesion can result from an atraumatic, degenerative injury such as consistent, repetitive overhead shoulder motions like throwing.[3]

A SLAP lesion commonly results in sporadic shoulder pain, often most associated with overhead activities. This may involve painful clicking or catching.[1] However, this type of shoulder injury can be relatively pain-free for long periods of time. Level and frequency of pain are dependent on the mechanism of injury and how the shoulder functions with sport and work-specific tasks.[3]

There are four categories of SLAP lesions (I-IV)[2] with a type II SLAP lesion being the most common tear type that requires surgical intervention.[1] In this type of injury, both the long head of the biceps brachii tendon and the labrum peel off the glenoid fossa.[2]

Diagnosing a SLAP Lesion

There are several methods used to diagnose a SLAP lesion. Your healthcare provider will assess the shoulder through a physical exam to evaluate the integrity of the shoulder joint and surrounding body regions. They may also recommend diagnostic imaging be taken of the shoulder to further assess structural involvement of the shoulder.

Several diagnostic imaging procedures are used to assess the glenoid labrum and surrounding structures.[4] Typically your doctor will start with radiographs (X-Rays) to assess the bony alignment of your shoulder. They may also refer you for Magnetic Resonance Imaging (MRI) or Magnetic Resonance Angiogram (MRA) to better assess the soft tissue structures of the shoulder such as tendons and ligaments which will assist in the diagnosis and potential surgical planning for SLAP lesions.[4]

A diagnostic arthroscopy (surgical procedure performed to visualize the joint) is the most definitive method to determine a SLAP lesion.[1,4] During a diagnostic arthroscopy, an orthopedic surgeon can confirm the presence of a SLAP lesion using an arthroscopic camera to assess the inside of the shoulder complex.[1,4]

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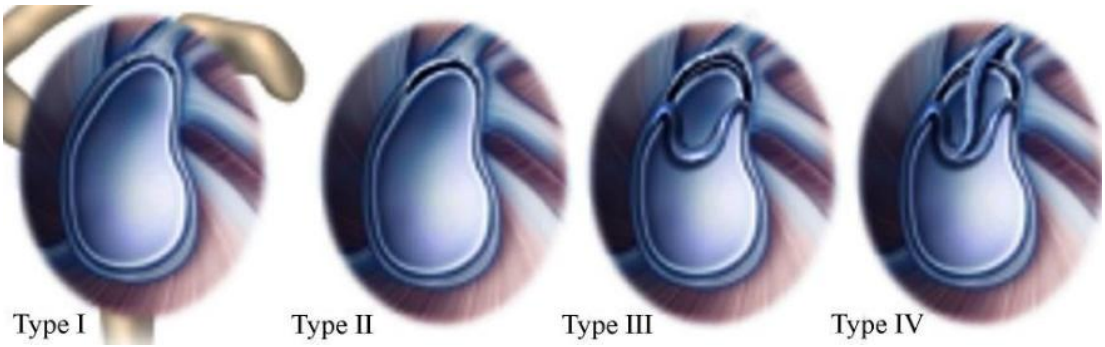

Image 2: SLAP lesion types (Snyder et al.) Type I: frayed or degenerative labrum with attachment of the labrum to the glenoid. Type II: detachment of superior labrum and biceps from the glenoid rim. Type III: bucket-handle tear of the labrum with an intact biceps anchor. Type IV: bucket handle tear of the labrum that extends into the biceps tendon.

Treatment Options for a SLAP Lesion

Treatment options are always specific and individualized to the patient. Considerations are made for patient age, activity level, demands of sport or work, and current limitations in daily activity.[5-7] Research shows that non-operative treatment may be effective in returning you to your previous level of activity, work, or sport depending on tear type.[7] Non-operative treatment typically includes a period of activity modification with the prescription of a functional exercise program by a skilled physical therapist.[7]

If your symptoms don't improve with a non-operative course of rehabilitation, surgery may be warranted.[8-9] Common indications for surgery include[9]:

- ✓ Type of SLAP lesion;
- ✓ Age;
- ✓ Sport/work requirements;
- ✓ Overall physical health;
- ✓ Failed non-operative care.

This will include a repair of the superior labrum, and will be performed arthroscopically using suture anchors to reattach the labrum to the glenoid fossa (bone of the shoulder blade).[8] The number of anchors used will depend on the size of the tear.[8]

Rehabilitation Following Surgery

Most patients will undergo **6-9 months** of rehabilitation[10-12] following a SLAP repair, emphasizing gradual return to daily activities, work, or sport. During rehabilitation, your physical therapist will work with you to set individualized goals, and perform frequent re-assessment of these goals over the course of your rehabilitation plan.[12]

Following post-surgical precautions and completing a structured rehabilitation program can contribute to increased success and decreased re-injury risk following a SLAP repair.[9] General timelines are given as a guideline only and must be adjusted based on individual factors including age, injury severity, activity level, your response to surgery and other anatomical structures involved (i.e. biceps brachii, rotator cuff musculature, joint capsule).[9,11] Presence or lack of these other factors may lengthen or shorten your rehab timeline.

Once your strength, range of motion and activity tolerance are appropriate, and your physician and sports medicine team have approved, you will perform a full return-to-work / return-to-sport activity progression.[11-12]. If throwing is your goal, you will go through a full interval throwing program (see **Appendix F**).

Rehabilitation Guidelines for SLAP Lesion Repairs

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Rehabilitation Guidelines for SLAP Lesion Repairs

Rehabilitation Guideline

SLAP lesion repairs are commonly performed following a **Type II SLAP lesion**. The protocol outlined in this document is designed for the rehabilitation of general Type II SLAP lesion. When there are additional structures involved, or poor tissue quality is present, rehabilitation following surgery will need to be adjusted. Several common findings and adjustments to the rehabilitation protocol are included for consideration.

Summary of Recommendations	
Risk Factors	• Repeated overhead activity. • Poor shoulder or scapular strength, stability or neuromuscular control. • Poor trunk mobility. • Falling or contact sports. • Faulty mechanics. • Return to sport or work without meeting appropriate criteria.
Rehabilitation Goals	• Restore shoulder and scapular neuromuscular control, strength, endurance, stability and mobility through therapeutic interventions. • Complete a return to throw program (if appropriate).
General Precautions	• Excessive external rotation above guideline recommendation. • Excessive biceps loading. • Cross body motion. • Shoulder extenson with elbow extension.
Manual Therapy	• Joint mobilizations to decrease pain initially and to improve ROM if needed. • Soft tissue mobilizations as needed.

Outcome Testing	• Strength testing for internal rotation and external rotation strength ratios vs uninvolved and based on sport. (Isokinetic testing if available).
	• Performance at or above normative values on upper extremity functional tests
	  • Upper Quarter Y-balance: within 90% of non-operative shoulder.
	  • Closed Kinetic Chain Upper Extremity Stability: normative data for males is 20 touches; normative data for females is 18 hand touches.
	  • Seated Shot-Put: within normative values for age/gender.
	  • Symmetry in power with ballistic ball.

Criteria for Discharge	• Restoration of range of motion and strength. • Completion of progressive return to sport/throwing program. • No pain at rest or during activity. • Minimal clinical important difference for functional outcome measure.

Rehabilitation Guidelines for SLAP Lesion Repairs

Phase I: 0-2 weeks post-surgery	
Appointments	Surgeon/Physician Assistant follow-up: 7-10 days post-op Physical Therapy appointments: 1-2x / week (starting 1-2 weeks post-op)

Precautions	Sling/Immobilization:
	• Worn at all times outside of physical therapist guided treatment and performance of home exercises
	Range of Motion:
	• No shoulder external rotation (ER) passive (PROM) beyond neutral until **week 4**
	• No long head biceps tension
	  ○ No active (AROM) or active assisted (AAROM - no pulleys, pendulums, or wand exercises) until **week 6**
	  ○ No AROM/AAROM elbow supination/flexion until **week 6**

Rehabilitation Goals	• Protect surgical repair • Minimize inflammation and shoulder pain
Range of Motion	PROM: • Flexion ≤ 75º in scapular plane • ER ≤ 0º in scapular plane • IR ≤ 45º in scapular plane AAROM/AROM: • Elbow, wrist, hand all planes ○ No AROM/AAROM elbow supination/flexion until **week 6**

Therapeutic Interventions
(Examples, but not limited to…)
	General post-operative education – emphasis on protection of repair
	• Sleeping position: while immobilized in sling: on back, with a pillow propped underneath the upper arm.
	• Precautions:
	  – No active movement of arm
	  – No sling removal of sling except for prescribed exercises
	  – Avoid sudden movements.
	Management of post-operative inflammation:
	• Ice/cooling: up to 6x/day or as needed for pain (20 mins on every two hours as needed)
	Exercise Interventions:
	• Cervical spine endurance and mobility
	• Scapular activation in sling and a neutral shoulder position
	  ○ Consider side-lying therapist assisted scapular PNF drills for activation and mobility
	Manual Therapy:
	• Posterior rotator cuff soft tissue mobilizations for pain management
	• Cervical and scapular muscle region soft tissue mobilizations for pain management

Progression Criteria	✓ Achieve PROM goals outlined above ✓ Decreasing pain level with ADL/IADL tasks in sling

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Rehabilitation Guidelines for SLAP Lesion Repairs

Phase II: 2-6 weeks post-surgery	
Appointments	Surgeon/Physician Assistant follow-up: 6 weeks post-op Physical Therapy appointments: 1-2x / week

Precautions	Sling/Immobilization:
	• Worn at all times outside of physical therapist guided treatment and performance of home exercises
	• Begin progression from sling starting a **week 6**
	Range of Motion:
	• No long head biceps tension
	  ○ No active (AROM) or active assisted (AAROM - no pulleys, pendulums, or wand exercises) until **week 6**
	  ○ No AROM/AAROM elbow supination/flexion until **week 6**

Rehabilitation Goals	• Protect surgical repair • Minimize inflammation and shoulder pain • Promote dynamic stability through muscle activation surrounding glenohumeral and scapulothoracic joints

Range of Motion	PROM:
	• Flexion
	  ○ **Weeks 2-4:** ≤ 90º in scapular plane
	  ○ **Weeks 4-6**: ≤ 120º in scapular plane
	• Abduction
	  ○ **Weeks 2-4:** ≤ 80º
	  ○ **Weeks 4-6**: ≤ 100º
	• ER
	  ○ **Weeks 2-4**: ≤ 15º in scapular plane
	  ○ **Weeks 4-6**: ≤ 30º in scapular plane
	• IR ≤ 60º in scapular plane
	  ○ Progress to IR in 45º abduction by **week 4** and 90º abduction by **week 6** (to point of soft tissue restriction)
	AAROM / AROM:
	• Elbow, wrist, hand all planes
	  ○ No AROM/AAROM elbow supination/flexion until **week 6**
	• Shoulder
	  ○ **Week 4**:
	  ▪ Introduce AAROM shoulder IR and ER in scapular plane
	  ○ **Weeks 5-6**:
	  ▪ Abduction AROM as tolerated to 90º
	  ▪ IR and ER AROM as tolerated at 0º - 45º abduction

Therapeutic Interventions
(Examples, but not limited to…)
	Cardio:
	• Lower extremity endurance with bike, climber or treadmill walking (speed and incline intervals)
	  ○ No running - secondary to upper extremity distraction forces associated w/arm swing
	Manual Therapy:
	Low grade posterior glenohumeral joint mobs for pain relief
	Strengthening:
	• Cervical spine muscular endurance
	• Scapular muscle group activation and motor control progressions (in neutral shoulder positions)
	• Shoulder complex sub-maximal isometrics – starting **week 3**
	  ○ IR and ER in 0º - 45º abduction
	  ○ Abduction and adduction within ROM restrictions outlined above
	• Hand/wrist and forearm/elbow complex progressions

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	○ Introduction of grip variety with all RTC activation and strength progressions ○ Consider rate of force development focus with isolated grip strength tasks
Criteria to Discontinue Sling	✓ No sooner than 6 weeks post-op ✓ No pain ≥ 2/10 with arm resting at side for walking and ADL tasks ✓ Ability to maintain mobility restrictions without sling (see precautions above)
Progression Criteria	✓ Achieve PROM, AAROM and AROM goals outlined above ✓ Tolerance to sling discharge criteria outlined above

Post-op Glenoid Labral Repair: Sling Weaning Progression

Day 1	Out of sling for **1 hour** / In sling for 1 hour – repeat Continue to sleep in the sling
Day 2	Out of sling for **3 hour** / In sling for 1 hour – repeat Continue to sleep in the sling
Day 3	Out of sling for **5 hour** / In sling for 1 hour – repeat Continue to sleep in the sling
Day 4	Out of sling for **full day**, but use as needed Continue to sleep in the sling
Day 5	Full day out of sling (including sleeping out of sling)

***If you notice shoulder **soreness** that lasts longer than 24 hours, repeat the previous day before progressing hours out of the sling.*

***If you have a job that requires more manual specific labor / use of your arms, it is recommended that during this weaning process you still wear your sling at work.*

Rehabilitation Guidelines for SLAP Lesion Repairs

Phase III: 6-12 weeks post-surgery	
Appointments	Surgeon/Physician Assistant follow-up: 12 weeks post-op Physical Therapy appointments: 1x / 1-2 weeks

Precautions	Range of Motion:
	• Continue to minimize long head biceps tension
	  ○ AROM / AAROM for shoulder flexion and abduction in gravity minimized positions
	  ○ Progress shoulder IR AAROM/AROM in front of the body (avoid IR reaching up behind the back)
	Load/strength: consider long head biceps tension
	• Gradual progression of biceps load beginning week 6
	  ○ Do not progress beyond 10 pounds
	• Avoid latissimus dorsi pull-downs and isolated rows
	• Gradual progression of shoulder extension or horizontal abduction beyond neutral

Rehabilitation Goals	• Preserve integrity of surgical repair • Progress back to full shoulder PROM in all planes • Progress rotator cuff strength in neutral shoulder position

Range of Motion	PROM/AAROM/AROM: consider precautions above
	• Shoulder
	  ○ Flexion, abduction and adduction:
	  ▪ Progression to full, symmetrical ROM
	  ○ ER:
	  ▪ **Week 6-8**: ≤ 90º in 0º - 45º abduction
	  ▪ **Weeks 8-12**: ≤ 90º in 90º abduction
	  • Beyond 90º as tolerated in throwing / overhead athletes
	  ○ IR:
	  ▪ **Week 6-8**: ≤ 70º in 0º - 45º abduction
	  ▪ **Weeks 8-12**: ≤ 70º in 90º abduction
	  ○ Extension: to neutral
	• Elbow, wrist, hand all planes

Therapeutic Exercises
(Examples, but not limited to…)
	Cardio:
	• Lower extremity endurance with bike, climber or treadmill walking (speed and incline intervals)
	  ○ Consider jogging progression starting **week 8** as guided by your physical therapist
	Early strengthening:
	• Continue cervical and scapular load progressions with considerations for ROM precautions outlined above
	• Shoulder complex load progressions
	  ○ Sub-maximal isometrics isometrics at increasing angles of shoulder flexion and abduction
	  ○ Low load shoulder IR and ER in scapular plane
	  ○ Low load with prone scapular strength progressions (I, Y, T and A positions as mobility allows)
	• Long-lever UE stability (consider emphasis on grip for proximal stability
	  ○ Low load single arm carry progressions

	○ Low load isometric weighted holds in flexion, scaption and abduction planes (supine and side-lying) <u>Late strengthening:</u> • Continue cervical and scapular load progressions with considerations for ROM precautions outlined above • Shoulder complex load progressions ○ Low load shoulder IR and ER in progressive angles of shoulder abduction (work up to 90º abduction as mobility allows) ○ Progress load with prone / quadraped scapular strength progressions (I, Y, T and A positions as mobility allows) ○ <u>No</u> resisted straight-arm elevation until **week 10** • Long-lever UE stability ○ Modified closed-kinetic chain positions with emphasis on serratus muscle activation ○ Low load shoulder scaption and abduction tasks ○ Scapular PNF patterns with therapist applied perturbations ▪ Decrease predictability of perturbation direction <u>Manual Therapy</u>: • Posterior and inferior grade III-IV GH joint mobilizations as indicated • Posterior rotator cuff and scapular mm soft tissue mobilizations for recovery
Criteria for Progression to Next Rehabilitation Phase / Initiation of UE plyometrics	✓ Full, procedure-specific PROM, AAROM and AROM in all planes (see parameters above) ✓ Tolerance to early and late-phase strengthening without reactive pain > 2/10 ✓ Completion of ADLs without pain ✓ Initiation of UE plyometrics • No sooner than 12 weeks post-op • See **Appendix E**

Rehabilitation Guidelines for SLAP Lesion Repairs

Phase IV: 12-16 weeks post-surgery	
Appointments	Physical Therapy appointments: 1x / 1-2 weeks
Precautions	Range of Motion: n/a • Continue to address any posterior GH capsular tightness as indicated Load/strength: reactive pain with all exercises ≤ 2/10
Rehabilitation Goals	• Establish and maintain full, symmetrical shoulder ROM in all planes • Improve shoulder muscular strength, power and endurance • Gradually initiate return to functional and sport-specific activities
Range of Motion	PROM/AAROM/AROM: • Progress as needed for ADL, IADL, work and sport-specific demands ○ Achieve throwers total arc (especially ER)

Therapeutic Exercises *(Examples, but not limited to…)*	Cardio:
	Re-incorporate into team-based conditioning drills as appropriate
	• Swimming is *not* appropriate until tolerance to UE plyometrics has been established
	Strengthening:
	• Progress sport-specific cervical and scapular load in various planes of shoulder flexion and abduction
	• Shoulder complex load progressions
	  ○ Challenge shoulder IR and ER in various planes of shoulder flexion and abduction
	  ▪ Progress time under tension, speed and reactivity components of these tasks
	  ○ Concentric and eccentric load in all planes of shoulder and scapular PNF patterns
	• Long-lever UE stability
	  ○ Progressive load and increased single arm stability demands with closed-kinetic chain positions
	  ▪ Continue to emphasize serratus muscle activation
	  ○ Increase single arm carry load in various rack positions
	UE Plyometrics: (if appropriate strength / motor control criteria met – **Appendix E**)
	• Early: 2-handed drills below shoulder height
	  ○ Med med ball chest pass (standing and supine)
	• Middle: 2-handed drills above shoulder height
	  ○ Med ball slams, med ball scoop toss and med ball rotational throws
	• Late: 1-handed drills in functional, sport-specific positions
	  ○ Plyo ball overhead wall dribbles
	  ○ Reverse D2 pattern throws
	Manual Therapy:
	• Posterior glides grade III-IV at glenohumeral joint as need for posterior joint capsule mobility restrictions

Criteria for Progression to Next Rehabilitation Phase / Sport Participation	See **Appendix E**

Rehabilitation Guidelines for SLAP Lesion Repairs

Phase V: 16+ weeks post-surgery	
Appointments	Physical therapy 1 visit every 2-3 weeks. Surgeon follow-up at 6 months.
Precautions	• Avoid activities that create substitution patterns for muscle activation. • No sudden or significant increases in muscular control or load. • Progress gradually into sport specific movements.
Rehabilitation Goals	• Normalize shoulder muscular strength and power (greater than 90% Limb symmetry index). • Progressive return to functional activities involving greater resistance. • Complete return-to-sport training.
Range of Motion	• Continue mobility exercises.

Therapeutic Interventions
(Examples, but not limited to…)
	Cardio:
	Cardiovascular fitness emphasizing sport specific energy systems
	Full incorporation into team-based conditioning drills as appropriate
	• Swimming as appropriate – see **Appendix E**
	Strengthening:
	• Challenge sport-specific cervical and scapular load in various planes of shoulder flexion and abduction
	• Shoulder complex load progressions
	  ○ Progress shoulder IR and ER in various planes of shoulder flexion and abduction
	  ▪ Increase difficulty with time under tension, speed and reactivity components of these tasks
	  ▪ Incorporate sport-specific trunk and LE movement patterns
	  ○ Concentric and eccentric load in all planes of shoulder and scapular PNF patterns
	• Long-lever UE stability
	  ○ Increase load, speed and reactivity with both closed-kinetic-chain and single arm carry positions
	UE Plyometrics: (if appropriate strength / motor control criteria met – **Appendix E**)
	• Progress speed, load, reactivity and sport-specific movement patterns with double and single arm drills
	Manual Therapy:
	• Posterior glides grade III-IV at glenohumeral joint as need for posterior joint capsule mobility restrictions

Criteria for Return to Throw / Full Return to Sport	✓ Physician clearance ✓ See **Appendix E**

***Important to continue participation in ongoing preventative strength, power and motor control exercises at return to sport**

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