

ARTHROSCOPIC ANTERIOR STABILIZATION

The intent of this protocol is to provide the clinician with instruction, direction, rehabilitative guidelines and functional goals for all stabilization procedures. It is not intended to be a substitute for clinical decision making regarding the progression of a patient's post-operative course based on physical exam/findings and individual progress. The physiotherapist must exercise their best professional judgment to determine how to integrate this protocol into an appropriate treatment plan. The general treatment for a variety of shoulder procedures involves protection of the repair, stretching/mobilizing tight or restricted structures, strengthening the rotator cuff and strengthening and retraining the scapular musculature. Progression of treatment from one phase to the next is based on achieving the appropriate level of soft tissue healing and physical performance criteria. As an individual's progress is variable and each will possess various pre-operative deficiencies, this protocol must be individualized for optimal return to activity. Some exercises may be adapted depending on the equipment availability at each facility. There may be slight variations in this protocol or additional restrictions placed by the surgeon post-operatively depending on findings at the time of the surgery. If a clinician requires assistance in treatment progression please contact the referring physician or the physiotherapy department.

DEFINITIONS

- **Bankart:** detachment of the anteroinferior glenohumeral ligament complex from the glenoid
- **Hill-Sachs:** cortical depression on the posterior lateral aspect of the humeral head from impaction against the anteroinferior glenoid rim with an anterior shoulder dislocation. This lesion has been reported in as many as 80% of traumatic anterior dislocations and 88% in recurrent dislocations¹.
- **SLAP: Superior Labrum lesion from Anterior to Posterior** in the shoulder. The 4 types are surgically managed in different ways and post surgical rehabilitation is strongly dependent on the stability of the biceps origin:
 - Type I: debridement
 - Type II: sutured/tacked
 - Type III: excision of bucket handle tear
 - Type IV: excision of bucket handle tear and the attached bicep if < 30-40% of tendon²⁻⁴

HEALING TIMELINES

After the initial inflammatory phase (1-3 days post surgery), tissue repair begins by laying down collagen/scar tissue along the surgical sites and repaired areas (days 3-20) and only minimal stress is tolerated. In the first 3 weeks post surgery, the rehabilitation program is designed to relieve pain, minimize inflammation and normalize scapulothoracic movement. From 3-12 weeks, the scar tissue is progressively stronger and more responsive to remodelling. At this point gradual stress can be placed on the surgical repair areas and glenohumeral joint range of motion (ROM) can be progressed⁵.

STRUCTURES WHICH REQUIRE PROTECTION DURING REHABILITATION

With the arthroscopic nature of this surgery, the rotator cuff is not significantly disturbed. As a result, active range of motion (AROM), dynamic stability activities, and strengthening does not need to be delayed to protect the rotator cuff. However, sutures, anchors, capsule, ligament and labrum need significant protection for undue stress for a period of time (usually 6 weeks) to facilitate appropriate tissue healing⁶. As a result, specific restrictions will be outlined by the surgeon depending on the associated injuries found at the time of surgery.

GLENOHUMERAL LIGAMENTS

The glenohumeral joint is stabilized by the capsuloligamentous complex. The 3 anterior stabilizing structures are the superior, middle and inferior glenohumeral ligament. The inferior glenohumeral ligament consists of an anterior and posterior band and an axillary pouch. With an anterior dislocation, it is typical to have a disruption of the inferior glenohumeral ligament which consists of an anterior band, an axillary pouch and a posterior band. At 90° of abduction with external rotation (ER), the anterior band is the main restraint that consequently gets damaged⁷.

ROM GUIDELINES

Generally, 2-4 weeks of immobilization is common after arthroscopic instability repair^{8,9}. There is evidence that immediate staged ROM is safe and may provide earlier return to functional activity and ROM, however; long term results are not significantly different⁹.

Surgeon preferences for ROM goals and timelines should be followed. If no limits are given, the following table can be used as a general guideline for staged ROM:

Post op wk	Passive flexion (in scapular plane [#])	Passive ER at 20° abd (in scapular plane)	Passive ER at 90° abd	Active flexion (in scapular plane)
3	90°	10° - 30°	Contraindicated	85-90°
6	135°	35° - 50°	45°	120°
9	155°	Unaffected -10°	75°	150°
12	*WNL	*WNL	*WNL	*WNL

ER: External rotation

Abd: Abduction

[#]Scapular plane/plane of the scapula: 30° off of the sagittal plane

**WNL: within normal limits (allow pt to regain last 15° on own)*

Rehabilitation aims to restore ROM (within normal limits) by 12 weeks post arthroscopic stabilization¹⁰. ROM and strengthening activities should be slowly increased and not forceful or painful to ensure adequate healing. Gaining ROM too quickly (especially ER) may result in recurrent laxity, while gaining ROM too slowly may result in residual stiffness. During this early time period, terminal/end-range stretching should NOT be performed as these motions increase tension on the anteroinferior shoulder capsule and protection of the surgical repair is vital.

ROLE OF THE ROTATOR CUFF

The main role of the rotator cuff is to centralize and compress the humeral head in the glenoid fossa to maintain the instantaneous centre of rotation of the glenohumeral joint during arm movement. To be effective there must be an equal anterior/posterior balance of the rotator cuff (subscapularis = infraspinatus+teres minor) as well as an equal superior/inferior balance between the entire cuff and the deltoid muscles (subscapularis+infraspinatus+teres minor = deltoid)¹¹. If one part of the cuff is deficient an imbalance will result and the translatory force of the deltoid will pull the humerus in a superior direction up under the acromion leading to mechanical impingement. Therefore, exercises that produce the most supraspinatus and least deltoid activity may avoid potential deleterious superior humeral head migration associated with high deltoid activity.

SCAPULAR MOVEMENT

The scapula moves around three axes and has six movements: up/downward rotation, internal/external rotation, anterior/posterior tipping through muscle control (protraction/retraction refers to movement around the thorax). With the arm at side, the glenoid fossa is tilted 5° into upward rotation. At 90° of abduction the glenoid fossa is tilted enough to provide a stable platform to prevent inferior translation. In full abduction, the glenoid fossa is in upward rotation, external rotation and posterior tilt^{12,13}. Subjects with shoulder pain have been shown to lack upward rotation and posterior tilt^{14,15} resulting in less clearance space for the rotator cuff during elevation.

SCAPULAR FORCE COUPLES

There is a moving axis of rotation that commences at the root of the spine of the scapula on initiation of movement and travels along the spine of the scapula to the AC joint at the end range of elevation and abduction¹⁶. The main muscles that control scapular movement are trapezius, serratus anterior, rhomboids, levator scapula and pectoralis minor (see chart below). The most influential force couple that acts to upwardly rotate the scapula (glenoid fossa) is the trapezius (upper and lower fibres) and serratus anterior. From a pathology standpoint, this

force couple is often the problem source and can become dyskinetic during either/both concentric or eccentric phases of movement^{17,18}.

Muscle	Action
Upper Trapezius	Upward rotation, retraction, elevation
Middle Trapezius	Upward rotation, retraction
Lower Trapezius	Upward rotation, retraction, depression
Serratus Anterior	Upward rotation, protraction
Rhomboids	Downward rotation, retraction, elevation
Levator Scapulae	Downward rotation, elevation
Pectoralis Minor	Anterior tipping

PROPRIOCEPTIVE RETRAINING

Intact joint position sense (proprioception) is necessary for normal muscle coordination and timing. Joint proprioception plays an important role in stabilizing the glenohumeral joint by providing information from mechanoreceptors in the musculotendinous and capsuloligamentous structures to the central nervous system for the coordination of muscular activity and optimal joint positioning. Subjects with traumatic anterior shoulder instability have been found to have decreased joint position awareness¹⁹ and muscle activation abnormalities of the dynamic shoulder stabilizers²⁰ compared to subjects with normal shoulders. When these structures are injured, proprioceptive deficits and altered neuromuscular control can cause faulty movement patterns, functional instability and pain in the shoulder complex²⁰⁻²². In a non-athletic population, a long term follow-up study demonstrated that joint position sense can be restored after surgical stabilization²³. However, 30% of overhead athletes continue to have impaired joint position sense post stabilization and, as a result, are unable to return to their previous sporting level^{24,25}. This may be accounted for by the different demands placed on the shoulder in these two populations.

QUALITY VS. COMPENSATION

Physiotherapists often feel compelled to progress patients by giving them new exercises each time they are in for therapy. It cannot be stressed enough that it is **not** beneficial to give patients exercises they are not neuromuscularly ready for. It is very important to observe the *quality* of the exercises that are being performed, specifically with rotator cuff and scapular stabilization exercises. Weaknesses in specific muscle groups lead to compensations, which produce faulty movement patterns. These faulty patterns are then integrated into unconscious motor programs, which perpetuate the original weakness.

Phase I (General timeline: 0-6 weeks)

GOALS

- Patient Education: posture, joint protection, positioning, hygiene, restrictions
- Immobilization to protect surgical procedure (capsule, ligaments, labrum, sutures)
- Minimize shoulder pain and inflammatory response
- Achieve staged ROM goals through gentle ROM activities
- Active ROM uninvolved joints (elbow, wrist, hand)
- Normalize scapular position, mobility and dynamic stability
- Maintain cardiovascular fitness and lower limb and trunk muscle condition¹⁰

PRECAUTIONS

- Weeks 0-4: Remain in sling (include sleeping), remove for showering, range of motion
- Weeks 5-6: Sling use when moving around for longer periods of time or out in public
- Limit ER and extension
- No lifting objects with operative shoulder or arm use beyond ROM restrictions

EXERCISE SUGGESTIONS:

PROM & AAROM

- Elbow: Active & passive - flexion (if SLAP repair wait 6 wks) /extension/pronation/supination
- Wrist: Active & passive - flexion/extension/radial & ulnar deviation
- Neck: general ROM if needed
- Shoulder: use pulleys, cane, stick, opposite arm, finger ladder (all in scapular plane to maximize humeral head/glenoid congruency¹⁰)
 - P/AAROM flexion: 45-70° (wks 1-2), 90° (wk 3), 135° (wk 6)
 - P/AAROM ER: 0-5° (wks 1-2), 10-30° (wk 3), 35-50° (wk 6)
 - P/AAROM IR: 15-20°, hand behind back: posterior belt line (wk 5-6)

Muscle Activation / Strength Maintenance

General:

- Ball squeezes
- Pendulums for pain control (use body sway to move extremity: forward/back, side/side)
- Posture awareness / exercises (scapular retraction, shoulder rolls)
- Scar management

Rotator Cuff:

- Week 2: (if pain free) Sub maximal isometrics in neutral as tolerated¹⁰
[*caution with IR if open Bankart with subscapularis reattached]¹⁰
- Week 4: Sidelying ER with towel – no weight

Scapula:

- Bilateral elevation /depression/protraction/retraction¹⁰
- Supine serratus anterior protraction/retraction at 90° flexion → progress with small weights
- Rhythmic stabilization supine 90° flexion submaximal resistance on upper arm for all planes of movement⁵
- Supine bent elbows barrel hug
- Scapular clock exercises and progress to scapular strengthening at tolerated²⁶

Proprioceptive Retraining

- Week 3: Upper extremity weight-bearing exercises for scapular movements at GH angles below 60 degrees elevation¹⁰
 - i.e. Standing with swiss ball on floor – hand on ball with pressure forward/backward, side to side, circles,
 - Standing weight-bearing shifts with hands on bed/plinth → progress to single arm weight-bearing²⁷

Modalities

- Ice 15 minutes every few hours for pain relief^{1, 10}
- Interferential current therapy (pain relief)

Cardiovascular Fitness

- Bicycle, elliptical, stairmaster, walking

MILESTONES TO PROGRESS TO PHASE II

1. Appropriate tissue healing from surgery by following precautions and immobilization guidelines
2. ROM guidelines met but not significantly exceeded.
3. Pain control within allowed ROM

Phase II (General timeline: 6-12 weeks)

GOALS

- Continued patient education: ADL's in painfree range (waist level activities → progress to shoulder level → overhead activities), avoid heavy lifting or positions of instability during ADL's i.e. end range ER and combined abduction/ER
- P/AAROM to achieve staged ROM goals, may have ~10° loss of motion at ends of range from surgical procedure (esp. ER and flexion)
- Progression of exercise: passive (P) → active assisted (AA) → active (A) → addition of resistance (tubing or weights)
- Establish basic rotator cuff endurance and scapular neuromuscular control
- Later in phase, introduce functional patterns of movement

PRECAUTIONS

- Avoid terminal stretches at end range ER or in 90/90 positions.
- (Most times only light stretching or no stretching is needed)
- Avoid exercises that load the anterior capsular structures in a position of horizontal abduction or combined abduction and ER (i.e. **NO** push-ups, pec flies) during this timeframe
- Avoid heavy lifting or plyometrics
- Avoid exercises that may cause impingement i.e. empty can
- Ensure exercises are performed pain free and without substitutions or altered movement patterns
- (Exercise quality)

EXERCISE SUGGESTIONS:

PROM & AAROM

- Neck: general ROM if needed
- Thoracic spine: ensure proper extension to facilitate shoulder ROM
- Shoulder P/AAROM: Use pulleys, cane, stick, opposite arm.....
 - Flexion (scapular plane): 135° (wk 6), 155° (wk 9), near end range/160° (wk 12)
 - ER at 20° abduction (scapular plane): 35-50° (wk 6), 50-65° (wk 9), near end range/70° (wk 12)
 - ER at 90° abduction: 45° (wk 6), 75° (wk 9), near end range/80° (wk 12)

- IR at 20° abduction (scapular plane): 30-60°
- IR stretches: towel/cane assisted hand behind back (combination of ext/IR/hor add), sidelying sleeper stretch, cross arm stretch
- If ROM is significantly less than goals, joint mobilizations may be performed into the limited direction
- Progress finger ladder in flexion and scaption terminal ranges
- Arm bike/ergometer no resistance

Muscle Strength & Endurance

Rotator Cuff:

- Light isotonic with emphasis on high repetitions (4 sets of 15-20 reps) and low resistance (1-2 lbs):
- Sidelying ER with towel → progress to 1lb
- Standing ER & IR with towel: pulleys or light resistance tubing
- Rhythmic stabilization techniques for rotator cuff strengthening (ER/IR at 45° abduction in scapular plane)⁵

Scapula:

- Continue with shoulder retractions, shoulder rolls
- Supine rhythmic stabilization 90-100° flexion / joint perturbations in randomized directions → progressions: eyes closed, holding medicine ball²⁷
- Closed kinetic chain rhythmic stabilization:
- Ball stabilization on wall
- Static holds in push-up position on ball
- Light resistance extension, adduction, forward flexion (not past plane of body)
- Progress closed chain scapulothoracic mobility to shoulder level and then to overhead i.e.:
- Quadruped scapular protraction/retraction 90° progress to 120°
- Quadruped to tripod (2 to 1 arm)
- Standing short lever (elbow flexed) slides up wall → long lever → no wall support²⁸
- Strengthen scapular retractors and upward rotators i.e.:
- Prone arm raises at 0° progress to 90° and 120°
- Prone or seated rows → progress with resistance or weight
- Strengthen serratus
- Forward punch
- Push up with plus progress from wall to floor, on knees to feet
- Supine protraction/retraction with heavier weights

Proprioceptive Retraining

- Standing swiss ball on the wall at 90° flexion/scaption/abduction: circles, side to side, up and down, alphabet → progress 2 arms to 1 arm and ROM from 90° to 120°
- Therapist assisted joint/limb positioning with patient reproduction of position → mid ranges → end ranges → progress to eyes closed²⁷
- Weight-bearing activities on knees on unstable base i.e. Bosu, Wobble board, Airex pad, slider board
- Supine weighted ball drop at 90° shoulder flexion
- Supine weighted ball throw/catch → progress 2 arms to 1 arm
- Quadruped maintain proper scapula position
- Bodyblade: arm at side → 30, 90, 120, 160° in scaption and frontal plane → progress using PNF patterning
- Ball dribbles on wall

To increase proprioceptive input and difficulty, progression of exercises can be performed with eyes closed⁵

Modalities

- Ice 15-25 minutes¹
- Biofeedback: auditory, visual, tactile or machine
- Muscle Stimulation for posterior rotator cuff

Cardiovascular Fitness

- Bicycle, elliptical, stairmaster, treadmill jog→run, train specific to demand of sport

MILESTONES TO PROGRESS TO PHASE III

1. AROM guidelines met without pain or substitution patterns.
2. Good resting scapular posture and dynamic scapular control with ROM and strengthening exercises.
3. Able to perform recommended strengthening exercises without pain or difficulty.

Phase III (General timeline: 12-24 weeks)

GOALS

- Ensure ROM requirements are met
- Progressive strengthening, endurance, power and neuromuscular control exercises
- Progressive exercises in terms of speed once proficiency is demonstrated at slower speeds
- Activity specific progression: sport, work, hobbies
- Gradual and planned increase in stress to anterior capsule and labral tissues
- Gradual return to full ADL's, work and recreational activities
- Suggested Guidelines:
 - 3-4 months: may begin golfing
 - 4 months+: Interval Sports Programs: throwing, swimming, tennis, volley ball, gymnastics (surgeon approval)

PRECAUTIONS

- Avoid stress to the shoulder in a short period of time or in an uncontrolled manner
- Avoid advanced rehabilitation exercises (such as plyometrics or exercises at end range ER/Abd if the patient does not perform this activities during ADL's, work, or recreation
- Do not progress into activity specific training until the patient has nearly full ROM and strength
- Avoid weightlifting activities which place excessive stress on the anterior capsule i.e. lat pull downs and military press with hands behind the head and wide grip bench press. Exercises, such as dips, which encourage shoulder hyperextension, should be avoided. These exercises do not have any additional benefit in terms of muscle activity and other exercises can be substituted. Hand placement and depth on bench and incline press should be more narrow than normal to prevent stress on the anterior capsule when lowering weights⁵. The elbow should not pass the plane of the body - be sure to "always see your elbows" = Elbow Rule.

EXERCISE SUGGESTIONS:

ROM

- PROM/Stretching/Joint Mobilizations as needed to address any remaining deficits

Muscle Strength/Endurance/Power

Rotator Cuff:

- Progress ER/IR at side → to 45° → eventually to 90°
- *Scapula:*
- Rhythmic stabilization / joint perturbations in positions of function and vulnerability²⁷
- PNF diagonal patterns with bands/pulleys/manual resistance:

- D1 extension (high back hand to down to hitch hike position)
- D1 flexion (hitch hike to high back hand position)
- D2 extension (carry tray to hand in opposite front pocket position)
- D2 flexion (hand in opposite front pocket to carry tray position)
- Continue with shoulder strengthening program as initiated in Phase II with emphasis on faster speed, multiplanar activities which incorporate the kinetic chain

Proprioceptive Retraining (*open and closed kinetic chain*)

- Weight-bearing activities on toes on unstable base i.e. Bosu, Wobble board, Airex pad, slider board
- Swiss ball prone walk out
- U/E wobble board stability → progress to small push-up on board

Strength / Endurance / Power

- Replicate ADL / work activities / sport requirements
- Progressive return to weight-lifting program for larger upper extremity muscles (i.e. deltoid, lat dorsi, pec major): start with light weight / high reps (20-30 reps) → gradually increase weight and decrease repetitions.

Suggestions for **early in Phase III** (3-4 months):

- Biceps/Triceps (arm at side)
- Shoulder shrugs
- Rows (scapular retraction)
- Lat pull downs (hands in front)
- Shoulder press with hands in front of shoulders (not abducted/externally rotated)
- Push-up (only to 90° elbow flexion)

Suggestions to add for **intermediate Phase III** (4-5 months):

- Chest press / incline
- Machine / Barbell shoulder press (no end range abduction/external rotation)
- Prone horizontal abduction
- Prone ER at 90° abduction → progress weight as able

Suggestions to add for **late in Phase III** (5-6+ months):

- Military Press
- Flys / Reverse Flys
- Dead Lifts
- Power Cleans

Plyometric Program (if needed)

- Initiate in intermediate to late phase III (5-6+ months):
Suggestions/ideas:
 - Tubing plyometrics for ER/IR at 90° abduction with varying speeds
 - 2 handed tosses: waist/chest level → overhead → diagonal
 - 1 handed tosses: begin throw with shoulder flexion and mostly elbow extension → progress by increasing the amount of shoulder abduction/ER
 - Begin with towel, beach ball, kid's ball, tennis ball → progression to lightly weighted balls (plyoballs)

Cardiovascular Fitness

- Train specific to demand of sport (aerobic, anaerobic)

MILESTONES TO RETURN TO SPORT, WORK, HOBBIES

1. Therapist/Physician clearance
2. No complaints of pain or instability
3. Sufficient ROM to meet task demands
4. Good/Full strength and endurance of rotator cuff and scapular muscles for desired activities including adequate neuromuscular control

Shoulder Stabilization: Guidelines for Manual Therapy and Exercise

	Phase I	Phase II	Phase III
Range of Motion:			
Neck, elbow, wrist exercises	●		
Pendulums (body sway forward/back, side/side)	●		
Pulleys	●		
Cane/Stick	●		
Finger ladder	●	●	
IR stretches: towel/cane assisted hand behind back, sidelying sleeper stretch, cross arm stretch		●	
Joint mobilizations (only if needed in the limited direction)		●	
Muscle Strength & Endurance			
General:			
Ball squeezes	●		
Bilateral scapular retraction, shoulder rotations...	●		
Posture Awareness	●		
Rotator Cuff:			
Sub max isometrics in neutral (initiate week 2)	●		
Side lying ER (initiate week 4 in available range)	●		
Side lying ER with towel → progress to 1lb		●	
Standing ER & IR with towel: pulleys or light resistance tubing		●	
Rhythmic stabilization techniques for rotator cuff strengthening (ER/IR at 45° abduction in scapular plane)		●	
ER/IR at 45° → progress to 90° (weights, pulleys, tubing)			●
Scapula:			
Scapular clock	●		
Supine SA protraction/retraction at 90° flexion	●		
Supine bent elbows barrel hug	●		
Supine rhythmic stabilization 90-100° flexion / joint perturbations in randomized directions → progressions: eyes closed, holding medicine ball, positions of function and vulnerability		●	●
Closed kinetic chain rhythmic stabilization: ball stabilization on wall, static holds in push-up position on ball		●	●
Light resistance extension, adduction, forward flexion		●	●
Quadruped scapular protraction/retraction 90° progressions: ROM to 120°, quadruped to tripod (2 to 1 arm)		●	●
Standing short lever (elbow flexed) slides up wall → long lever → no wall support		●	●
Prone arm raises at 0° progress to 90° and 120°		●	●

	Phase I	Phase II	Phase III
Prone or seated rows → progress with resistance or weight		●	●
Forward punch		●	●
Push up+ progress from wall to floor, on knees to feet		●	●
Supine protraction/retraction with heavier weights		●	●
PNF diagonal patterns: bands/pulleys/manual resistance			●
Proprioception			
Weight-bearing (<60° elevation)	●		
Weight shifting	●		
Quadruped maintain proper scapula position		●	
Swiss ball on the wall at 90° flexion/scaption/abduction: circles, side to side, up and down, alphabet → progress 2 arms to 1 arm <i>and</i> ROM from 90° to 120°		●	
Ball dribbles on wall		●	
Joint/limb positioning with patient reproduction of position → mid ranges → end ranges → progress to eyes closed		●	●
Bodyblade: arm at side → 30, 90, 120, 160° in scaption and frontal plane → progress using PNF patterning		●	●
Supine weighted ball drop at 90° shoulder flexion		●	●
Supine weighted ball throw/catch → progress 2 arms to 1 arm		●	●
Weight-bearing activities on knees on unstable base i.e. Bosu, Wobble board, Airex pad, slider board → progress from activities on knees to toes...		●	●
Swiss ball prone walk out			●
U/E wobble board stability → progress to small push-up on board			●
Strength/Power/Endurance (Gym Program)			
Early in Phase III (3-4 months):			
Biceps/Triceps			●
Shrugs			●
Rows			●
Lat Pull Downs (hands in front)			●
Shoulder press with light weight (hands in front of shoulders)			●
Push-up (only to 90° elbow flexion)			●
Intermediate Phase III (4-5 months):			
Chest press/incline			●
Machine/Barbell shoulder press (no end range abd/ER)			●
Prone horizontal abduction			●
Prone ER at 90° abduction → progress weight as able			●
Late in Phase III (5-6+ months):			
Military Press			●
Flys/Reverse Flys			●
Deadlifts			●
Power Cleans			●
Plyometrics (if needed): Tubing ER/IR at 90° abduction with varying speeds 2 handed tosses: waist/chest level → overhead → diagonal 1 handed toss → progress by increasing the amount of shoulder abduction/ER			●

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