



SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

The following Shoulder Impingement Guidelines were developed by HSS Rehabilitation and are categorized into four phases, dependent on patient presentation and symptom irritability. Classification and progression are both criteria-based and patient specific. Linear progression through phases may not be indicated. Treatment occurs below shoulder height in phases 1 and 2, and above shoulder height in phases 3 and 4. The clinician should balance appropriate interventions for the optimization of functional activities and achievement of patient goals, while considering symptom irritability and resolution of impairments.

FOLLOW REFERRING PROVIDER MODIFICATIONS AS PRESCRIBED

SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

Phase 1: High to Moderate Irritability

PRECAUTIONS

- Avoid pain provoking activities and movements (e.g., sleeping on the shoulder, reaching overhead or out to the side, carrying heavy bags with involved extremity, weight bearing on involved extremity)
- Avoid painful exercises and activities (e.g., reaching behind back, overhead)
- Do not immobilize the shoulder and continue to use the arm for pain-free activities

ASSESSMENT

- Quick Disabilities of Arm, Shoulder & Hand (Quick DASH)
- Numeric Pain Rating Scale (NPRS)
- Posture
- Palpation (bony and soft tissue)
- Soft tissue quality and flexibility
- Joint mobility: glenohumeral (GH), acromioclavicular (AC), sternoclavicular (SC), scapulothoracic (ST) joints
- Cervical and thoracic mobility
- Scapula position and scapulohumeral rhythm
- Shoulder range of motion (ROM):
 - Passive range of motion (PROM) arc noting end feel
 - Active range of motion (AROM) noting painful arc
- Special tests for differential diagnosis of intra-articular, extra-articular or rotator cuff pathology
 - See Biederwolf reference for testing algorithm
- Strength: Manual muscle testing (MMT)
- Current activities and general fitness

TREATMENT RECOMMENDATIONS

- Patient education:
 - Nature of the condition
 - Activity modification to decrease or eliminate pain
 - Postural awareness & re-training
- Manual therapy: as indicated
 - Soft tissue mobilization (STM): e.g., posterior rotator cuff, levator scapulae, subscapularis, latissimus dorsi, pectorals, upper trapezius
 - Spinal mobilization/stabilization

- Joint mobilization for pain management
- PROM: initiate in scapular plane
- Therapeutic Exercises:
 - Active assistive range of motion (AAROM): e.g., pendulums; forward flexion, internal rotation (IR) and external rotation (ER) in scapular plane
 - Strengthening:
 - Deltoid isometrics
 - Peri-scapular muscles
 - Core activation exercises (unloaded)
 - Neuromuscular training (e.g., scapular rhythm training, rhythmic stabilization)
- Therapeutic taping
- Home exercise program (HEP)

CRITERIA FOR ADVANCEMENT

- Independent optimal postural awareness
- Reduced irritability
- Improved asymptomatic ROM

EMPHASIZE

- Patient understanding of condition
- Activity modification
- Symptom reduction

SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

Phase 2: Moderate to Low Irritability

PRECAUTIONS

- Avoid premature increase in activity level
- Avoid pain provoking activities and movements

ASSESSMENT

- Quick DASH
- NPRS
- Posture
- Palpation (bony and soft tissue)
- Soft tissue quality and flexibility
- Joint mobility: GH, AC, SC, ST Joints
- Cervical and thoracic mobility
- Scapula position and scapulohumeral rhythm
- Shoulder ROM:
 - PROM noting end feel
 - AROM noting painful arc
- Special tests for differential diagnosis of intra-articular, extra-articular or rotator cuff pathology
 - See Biedewolf reference for testing algorithm
- Strength: MMT
- Current activities and general fitness

TREATMENT RECOMMENDATIONS

- Patient education and activity modification
- Manual therapy: as necessary
 - PROM addressing deficits
 - Joint mobilization:
 - GH, AC, SC, ST, thoracic spine, scapula, 1st rib
 - STM: e.g., posterior rotator cuff, levator scapulae, subscapularis, latissimus dorsi, pectorals, upper trapezius

- Therapeutic Exercises:
 - ROM exercises addressing deficits
 - Strengthening:
 - Initiate elevation in the scapular plane
 - Isometrics (advance from short to long duration) → isotonics
 - Progress peri-scapular & deltoid strengthening
 - Initiate activation of rotator cuff (pain-free)
 - Advance core activation exercises
 - Kinetic cross-linking exercises: e.g., contralateral proximal lower extremity strengthening
 - Neuromuscular control and sequencing:
 - Bilateral UE closed chain exercises for stabilization – progressive load in scapular plane
 - Motor control activities for normalization of scapulohumeral rhythm
 - Dynamic neuromuscular stabilization – humeral head control in forward flexion, scaption, abduction
 - Cardiovascular conditioning (non-irritating)
- Advance HEP as tolerated

CRITERIA FOR ADVANCEMENT

- Good scapular control to 90° without pain in POS
- Minimal pain with ADL

EMPHASIZE

- Adjust exercise intensity (time, sets, reps) based on signs and symptoms
- Understand pathology and appropriate activity progression
- Maximize ROM and flexibility
- Maintain glenohumeral position throughout exercise progression

SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

Phase 3: Low to No Irritability

PRECAUTIONS

- Avoid overloading with progressive resistive exercises
- Avoid pain provocation activities and movements

ASSESSMENT

- Quick DASH
- NPRS
- Soft tissue quality and flexibility
- Posture
- Scapula position and scapulohumeral rhythm
- Cervical and thoracic mobility
- Scapulothoracic coupling
- Shoulder ROM
- Strength: MMT or dynamometry (if available)
- Appropriateness for progression from physical therapy to Performance Services

TREATMENT RECOMMENDATIONS

- Patient education and activity modification/progression
- Manual therapy: address remaining deficits from previous phases
- Therapeutic exercise:
 - Strengthening: progress isotonic exercises increasing load
 - Advance core strengthening (e.g., planks, prone trunk extension over a ball, bird dogs)
 - Single UE closed chain exercises for stabilization
- Neuromuscular control and sequencing:
 - Motor control exercises in multiplanar patterns (e.g., resisted/loaded proprioceptive neuromuscular facilitation (PNF))
 - Proprioceptive dynamic perturbations
- Plyometrics: Initiate two hand plyometrics progressing to overhead and single arm
- Cardiovascular conditioning
- Advance HEP as tolerated

CRITERIA FOR DISCHARGE (OR ADVANCEMENT TO PHASE 4 IF RETURNING TO SPORT)

- Good scapular control in plane of scapula above shoulder height without pain
- If returning to sport, consider collaboration with trainer, coach, or performance specialist as irritability resolves

EMPHASIZE

- Scapulothoracic coupling in overhead positions
- Restore full ROM
- Develop strength in previously painful functional positions

SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

Phase 4: Return to Sport (if applicable)

PRECAUTIONS

- Avoid too much, too soon: monitor exercise dosing
- Follow functional progressions
- Incorporate rest and recovery
- Monitor for loss of ROM/flexibility

ASSESSMENT

- Quick DASH including Sports Module
- NPRS
- Sport-specific readiness: e.g.
 - Isokinetic testing or hand-held dynamometry
 - Upper Quarter Y Balance Test™
 - Closed Kinetic Chain Upper Extremity Stability Test
- Quality of movement during sport-specific activities
- Strength: MMT or dynamometer (if available)
- Overall fitness level

TREATMENT RECOMMENDATIONS

- Progress isotonic exercises to higher loads in open and closed kinetic chain positions
- Sport-specific training including:
 - multidirectional core retraining
 - single arm plyometrics
 - throwing
 - total body multidirectional motor control and strengthening
 - e.g. Thrower's Ten/Advanced Thrower's Ten Programs
- Collaboration with trainer, coach, or performance specialist

CRITERIA FOR RETURN TO SPORT

- Independent with appropriate return to sport program
- Demonstrate movement patterns, strength, flexibility, motion, power, and accuracy to meet demands of sport

EMPHASIZE

- Self-monitoring volume and load progressions
- Speed, accuracy, power, and quality in sport-specific activities
- Collaboration with appropriate Sports Performance expert

SHOULDER IMPINGEMENT NON-OPERATIVE GUIDELINES

References

1. Abdulla SY, Southerst D, Cote P, et al. Is exercise effective for the management of subacromial impingement syndrome and other soft tissue injuries. A systematic review by the Ontario protocol for traffic injury management (OPTIMa) collaboration. *Man Ther.* 2015; 20:646-656.
2. Biederwolf NE. A proposed evidence-based shoulder special testing examination algorithm: clinical utility based on a systematic review of the literature. *Int J Sports Phys Ther.* 2013; 8:427-440.
3. Berckmans K, Castelein B, Borms D, et al. Analysis of scapular kinematics and muscle activity by use of fine-wire electrodes during shoulder exercises. *Am J Sports Med.* 2020;48(5):1213-1219. doi:10.1177/0363546520908604.
4. Bolia IK, Collon K, Bogdanov J, et al. Management options for shoulder impingement syndrome in athletes: insights and future directions. *Open Access J Sport Med.* 2021;12:43-53. doi:10.2147/oajsm.s281100.
5. 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(7):518-524.
6. Cuff A, Littlewood C. Subacromial impingement syndrome – what does this mean for the patient? A qualitative study. *Man Ther.* 2018;33:24-28.
7. Ellenbecker TS, Cools A. Rehabilitation of shoulder impingement syndrome and rotator cuff injuries: An evidence-based review. *Br J Sports Med.* 2010;44(5):319-327. doi:10.1136/bjsm.2009.058875.
8. Ellenbecker TS, Roetert EP. Testing isokinetic muscular fatigue of shoulder internal and external rotation in elite junior tennis players. *J Orthop Sports Phys Ther.* 1999;29(5):275-281.
9. Escamilla RF, Hooks TR, Wilk KE. Optimal management of shoulder impingement syndrome. *Open Access J Sports Med.* 2014; 5:13-24.
10. Escamilla RF, Ionno M, DeMahy MS, et al. Comparison of three baseball-specific 6-week training programs on throwing velocity in high school baseball players. *J Strength Cond Res.* 2012;26(7):1767-1781.
11. Gorman PP, Butler RJ, Plisky PJ, et al. Upper quarter Y balance test: reliability and performance comparison between genders in active adults. *J Strength Cond Res.* 2012;26(11):3043-3048.

12. Haik MN, Albuquerque-Sendin F, Camargo PR. Short-term effects of thoracic spine manipulation on shoulder impingement syndrome: a randomized control trial. *Arch Phys Med Rehabil.* 2017;98:1594-1605.
13. Hotta GH, Santos AL, McQuade KJ, et al. Scapular-focused exercise treatment protocol for shoulder impingement symptoms: three-dimensional scapular kinematics analysis. *Clin Biomech.* 2018;51: 76-81. doi:10.1016/j.clinbiomech.2017.12.005.
14. Johansson FR, Skillgate E, Mattis L, et al. Measuring eccentric strength of the shoulder external rotators using a handheld dynamometer: reliability and validity. *J Athl Train.* 2015;50(7):719–725.
15. Kang FJ, Chiu YC, Wu SC, et al. Kinesiology taping with exercise does not provide additional improvement in round shoulder subjects with impingement syndrome: a single-blinded randomized control trial. *Physical Therapy in Sport.* 2019;40:99-106.
16. Karel YHJM, Verhagen AP, Thoomes-de Graaf M, et al. Development of a prognostic model for patients with shoulder complaints in physical therapist practice. *Phys Ther.* 2017;97:71-80.
17. Kibler BW, Sciascia A. Evaluation and management of scapular dyskinesis in overhead athletes. *Curr Rev Musculoskelet Med.* 2019;12(4):515-526. doi:10.1007/s12178-019-09591-1.
18. Larsson R, Bernhardsson S, Nordeman L. Effects of eccentric exercise in patients with subacromial impingement syndrome: A systematic review and meta-analysis. *BMC Musculoskelet Disord.* 2019;20(1):1-22. doi:10.1186/s12891-019-2796-5.
19. Ludewig PM, Braman JP. Shoulder impingement: biomechanical considerations in rehabilitation. *Man Ther.* 2011;16(1):33-39. doi:10.1016/j.math.2010.08.004
20. Lee D-R, Kim, LJ. Reliability and validity of the closed kinetic chain upper extremity stability test. *J Phys Ther Sci.* 2015;27:1071–1073.
21. McClure PW, Michener LA. Staged approach for rehabilitation classification: shoulder disorders (STAR-shoulder). *Phys Ther.* 2015;95:791-800.
22. Plummer HA, Sum JC, Pozzi F, et al. Observation scapular dyskinesis: known-groups validity in patients with and without shoulder pain. *J Orthop Sports Phys Ther.* 2017;47:530-537.
23. Riemann BL, Davies GJ, Ludwig L, et al. Hand-held dynamometer testing of the internal and external rotator musculature based on selected positions to establish normative data and unilateral ratios. *J Shoulder Elbow Surg.* 2010;19,1175-1183.

24. Rosa DP, Borstad JD, Ferreira JK, et al. Comparison of specific and non-specific treatment approaches for individuals with posterior capsule tightness and shoulder impingement symptoms: A randomized controlled trial. *Brazilian J Phys Ther.* 2021; doi:10.1016/j.bjpt.2021.04.003.
25. Roy JS, Braen C, Leblond J. Diagnostic accuracy of ultrasonography, MRI and MR arthrography in the characterisation of rotator cuff disorders: a systematic review and meta-analysis. *Br J Sports Med.* 2015;49:1316-1328.
26. Sahin E, Dilek B, Baydar M, et al. Shoulder proprioception in patients with subacromial impingement syndrome. *J Back Musculoskeletal Rehabil.* 2017;30:857-862.
27. Saini SS, Shah SS, Curtis AS. Scapular dyskinesis and the kinetic chain: recognizing dysfunction and treating injury in the tennis athlete. *Curr Rev Musculoskelet Med.* 2020;13(6):748-756. doi:10.1007/s12178-020-09672-6.
28. Sharma S, Ghrouz AK, Hussain ME, et al. Progressive resistance exercises plus manual therapy is effective in improving isometric strength in overhead athletes with shoulder impingement syndrome: a randomized controlled trial. *Biomed Res Int.* 2021. doi:10.1155/2021/9945775.
29. Shih YF, Lee YF, Chen WY. Effects of kinesiology taping on scapular reposition accuracy, kinematics, and muscle activity in athletes with shoulder impingement syndrome: a randomized controlled study. *J Sports Rehabil.* 2018;27:560-569.
30. Westrick RB, Miller JM, Carow SD, et al. Exploration of the Y-balance test for assessment of upper quarter closed kinetic chain performance. *Int J Sports Phys Ther.* 2012;7(2):139-147.

Created: 6/2018

Revised: 9/2019, 9/2021; 8/2023