DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20261242

Review Article

Diagnostic pitfalls in shoulder impingement syndrome in overhead athletes: a narrative review

Jaxon S. Boley[1]*, Matthew A. Majer[1], Dona Hasou[2]

[1]American University of the Caribbean School of Medicine, Sint Maarten
[2]Randolph Health, Asheboro, North Carolina

Received: 17 February 2026
Accepted: 04 April 2026

***Correspondence:**
Dr. Jaxon S. Boley,
E-mail: jaxonboley@students.aucmed.edu

ABSTRACT

Shoulder impingement syndrome is a frequently assigned diagnosis in overhead athletes presenting with shoulder pain, yet it often serves as a nonspecific label rather than a precise explanation of symptoms. In this population, impingement complaints are more commonly secondary to altered glenohumeral mechanics, scapular dyskinesis, instability, or kinetic chain dysfunction rather than primary structural narrowing of the subacromial space. As a result, misdiagnosis is common and may lead to prolonged symptoms, ineffective rehabilitation, or unsuccessful surgical intervention. This narrative review examines common diagnostic pitfalls encountered in the evaluation of shoulder impingement syndrome in overhead athletes, discusses the limitations of imaging, and emphasizes the importance of sport-specific clinical assessment. A structured diagnostic algorithm is proposed to improve diagnostic accuracy and guide management in this challenging patient population.

Keywords: Sports medicine, Overhead athletes, Shoulder instability, Diagnostic pitfalls, Internal impingement

INTRODUCTION

Shoulder pain is a common complaint among overhead athletes and represents a frequent cause of functional limitation, time away from sport, and healthcare utilization. Among the various etiologies, shoulder impingement syndrome is one of the most frequently diagnosed conditions, particularly in athletes participating in repetitive overhead activities such as baseball, swimming, volleyball, tennis, and javelin throwing. Despite its prevalence, the term "shoulder impingement" is often used as a broad diagnostic label, encompassing a heterogeneous group of pathologies with distinct biomechanical and clinical implications.[1-3]

In overhead athletes, shoulder impingement frequently reflects a secondary process driven by altered glenohumeral mechanics, scapular dyskinesis, or microinstability rather than a primary structural narrowing of the subacromial space. As a result, misdiagnosis is common, particularly when evaluation relies heavily on nonspecific physical examination maneuvers or imaging findings without adequate consideration of sport-specific biomechanics. In clinical practice, these athletes are frequently treated for "impingement" despite persistent symptoms, often because the underlying biomechanical or instability-related contributors were not identified during the initial evaluation.[4-8]

The consequences of misdiagnosis are especially significant in overhead athletes, where subtle pathology can produce marked performance decline and where premature return to play or poorly targeted interventions may exacerbate injury. Conditions such as internal impingement, labral pathology, rotator cuff articular-sided tears, scapular dyskinesis, cervical radiculopathy, and neurogenic thoracic outlet syndrome can closely mimic classic impingement symptoms and are frequently overlooked.[9-14]

This narrative review aims to highlight common diagnostic pitfalls encountered when evaluating shoulder

impingement syndrome in overhead athletes. By reviewing the relevant pathophysiology, overlapping clinical presentations, and limitations of routine diagnostic strategies, this article seeks to provide a practical framework to improve diagnostic accuracy and guide appropriate management.

REVIEW

Pathophysiology of shoulder impingement in overhead athletes

Shoulder impingement syndrome has traditionally been described as mechanical compression of the rotator cuff tendons and subacromial bursa beneath the coracoacromial arch during arm elevation. While this model may apply to certain patient populations, it inadequately explains the mechanisms of pain and dysfunction observed in overhead athletes, in whom impingement is more commonly secondary to dynamic instability and altered kinematics.

Primary versus secondary impingement

Primary impingement is typically associated with structural factors such as acromial morphology, osteophyte formation, or thickening of the coracoacromial ligament, leading to static narrowing of the subacromial space. This form is more commonly observed in older, non-athletic populations.

In contrast, secondary impingement, which predominates in overhead athletes, arises from functional instability of the glenohumeral joint. Repetitive overhead motion results in excessive anterior or superior translation of the humeral head during arm elevation, producing dynamic impingement of the rotator cuff against surrounding structures. In younger overhead athletes, structural causes of impingement are uncommon, and symptoms attributed to acromial morphology often persist even after interventions directed at the subacromial space.[4,5]

Glenohumeral internal rotation deficit and scapular dyskinesis

Overhead athletes frequently develop glenohumeral internal rotation deficit due to adaptive changes in the posterior capsule and surrounding musculature. Posterior capsular tightness alters humeral head translation and increases rotator cuff stress. Scapular dyskinesis further disrupts normal scapulohumeral rhythm, reducing subacromial clearance and increasing mechanical load on the rotator cuff.[6,7]

Internal impingement and repetitive microtrauma

In throwing athletes, internal impingement represents a distinct mechanism in which the posterosuperior rotator cuff is compressed between the humeral head and posterior glenoid during the late cocking phase of throwing. Over time, repetitive microtrauma leads to cumulative tissue damage, altered neuromuscular control, and compensatory movement patterns.[8]

Common diagnostic pitfalls in shoulder impingement syndrome

Labeling all shoulder pain as subacromial impingement

Provocative maneuvers such as the Neer and Hawkins-Kennedy tests demonstrate high sensitivity but limited specificity in overhead athletes. Positive findings may reflect a range of underlying pathologies rather than true subacromial compression. This tendency toward diagnostic oversimplification is particularly common in high-volume clinical settings, where time constraints may limit sport-specific evaluation.[9-11]

Failure to recognize internal impingement

Internal impingement is frequently overlooked unless sport-specific movement patterns are carefully evaluated. Posterior shoulder pain during abduction and external rotation is often misattributed to subacromial pathology.[8]

Confusing rotator cuff pathology with instability

Subtle glenohumeral instability increases rotator cuff loading and may mimic impingement symptoms. Failure to recognize instability may result in persistent symptoms despite targeted rotator cuff treatment.[4]

Overlooking scapular dyskinesis

Abnormal scapular motion alters glenoid orientation and force coupling across the shoulder. Without addressing scapular dyskinesis, rehabilitation efforts are often unsuccessful.[6]

Ignoring cervical and neurogenic etiologies

Cervical radiculopathy, suprascapular nerve entrapment, and neurogenic thoracic outlet syndrome may present with shoulder pain and fatigue during overhead activity. Failure to perform a comprehensive neurologic and cervical examination may result in misdiagnosis.[12-14]

Over-reliance on imaging

MRI findings such as partial-thickness rotator cuff tears or labral fraying are common in asymptomatic overhead athletes. Imaging should support, not replace, clinical judgment.[13,14]

Role of imaging and its limitations

Plain radiographs may identify osseous abnormalities but are often normal in overhead athletes. MRI and MR arthrography provide detailed soft tissue evaluation but frequently reveal incidental findings that may not correlate with symptoms. In overhead athletes, imaging should be

viewed as a supportive tool rather than a definitive diagnosis. Structural abnormalities identified on advanced imaging are common in asymptomatic individuals and must be interpreted cautiously. In our experience, diagnostic error most often occurs when imaging findings are prioritized over clinical history and physical examination, particularly in athletes with subtle instability or biomechanical dysfunction.[15-20]

Clinical evaluation strategies to avoid misdiagnosis

Sport-specific history

Identification of the athlete's sport, position, training volume, and recent workload changes is essential. Pain should be correlated with specific phases of overhead motion. Athletes may also minimize symptoms early in the course of injury, making careful questioning essential to uncover performance-limiting pain patterns.[17]

Focused physical examination

Evaluation should include assessment of glenohumeral range of motion, stability, rotator cuff strength, and scapular motion. Glenohumeral internal rotation deficit and scapular dyskinesis should be actively assessed and compared with the contralateral side.[7]

Kinetic chain assessment and red flags

Deficits in posture, core strength, or lower extremity mechanics may contribute to shoulder pathology. Neurologic symptoms, persistent pain despite rehabilitation, or unexpected clinical deterioration should prompt consideration of alternative diagnoses.[18-20]

PROPOSED DIAGNOSTIC ALGORITHM

A structured diagnostic approach may assist clinicians in accurately evaluating shoulder pain in overhead athletes and avoiding common diagnostic errors. Initial assessment should emphasize sport-specific history and identification of symptom patterns related to phases of overhead motion. Targeted physical examination focusing on range of motion, stability, scapular mechanics, and kinetic chain function should guide diagnostic stratification. Imaging should be used selectively to support clinical suspicion rather than establish diagnosis in isolation. Reassessment following diagnosis-driven management is essential to ensure symptom resolution and identify alternative etiologies in patients who fail to improve.

MANAGEMENT IMPLICATIONS

Accurate diagnosis directly influences treatment selection and outcomes. When secondary or internal impingement is misdiagnosed as primary subacromial impingement, treatment is often ineffective, leading to prolonged symptoms and, in some cases, unnecessary procedures.

Nonoperative management should prioritize correction of biomechanical deficits, restoration of range of motion, and strengthening of the rotator cuff and periscapular musculature. Surgical intervention should be reserved for patients with structural pathology consistent with clinical findings. Return-to-play decisions should be guided by functional recovery rather than imaging findings alone.[21-24]

CONCLUSION

Shoulder impingement syndrome in overhead athletes is frequently misdiagnosed due to overlapping clinical presentations and over-reliance on imaging. A structured, sport-specific diagnostic approach improves clinical decision-making and reduces the risk of failed treatment. Recognizing these patterns requires deliberate attention to sport-specific demands and an understanding that shoulder pain in overhead athletes rarely reflects a single isolated pathology. Emphasizing biomechanical contributors and functional deficits rather than broad diagnostic labels allows for more effective management and optimized outcomes.

ACKNOWLEDGEMENTS

The authors would like to thank the staff at the Center for Haitian Studies for their support during clinical rotations.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Neer CS. Impingement lesions. Clin Orthop Relat Res. 1983;70:77.
2. Bigliani LU, Morrison DS, April EW. The morphology of the acromion and its relationship to rotator cuff tears. Orthop Trans. 1986;10:228.
3. Kibler WB, Sciascia A, Wilkes T. Scapular dyskinesis and its relation to shoulder injury. J Am Acad Orthop Surg. 2012;20:364-72.
4. Burkhart SS, Morgan CD, Kibler WB. The disabled throwing shoulder: spectrum of pathology. Arthroscopy. 2003;19:404-20.
5. Walch G, Liotard JP, Boileau P, Noël E. Posterosuperior glenoid impingement of the shoulder in the athlete. J Shoulder Elbow Surg. 1991;1:238-45.
6. Mihata T, McGarry MH, Kahn T, Lee TQ. Biomechanical role of scapular dyskinesis in shoulder impingement. Am J Sports Med. 2015;43:432-8.
7. Wilk KE, Macrina LC, Fleisig GS, Porterfield R, Simpson CD, Harker P, et al. Correlation of glenohumeral internal rotation deficit and shoulder injuries in professional baseball pitchers. Am J Sports Med. 2011;39:329-35.

8. Myers JB, Laudner KG, Pasquale MR, Bradley JP, Lephart SM. Glenohumeral range of motion deficits and posterior shoulder tightness in throwers with pathologic internal impingement. Am J Sports Med. 2006;34:385-91.
9. Seitz AL, McClure PW, Finucane S, Boardman ND 3rd, Michener LA. Mechanisms of rotator cuff tendinopathy: intrinsic, extrinsic, or both? J Orthop Sports Phys Ther. 2011;41:932-42.
10. Lewis JS. Rotator cuff tendinopathy: a model for the continuum of pathology and related management. Br J Sports Med. 2010;44:918-23.
11. Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome. J Bone Joint Surg Am. 2005;87:1446-55.
12. Hegedus EJ, Goode AP, Cook CE, Michener L, Myer CA, Myer DM, et al. Which physical examination tests provide clinicians with the most value when examining the shoulder? Br J Sports Med. 2008;42:80-92.
13. Miniaci A, Mascia AT, Salonen DC, Becker EJ. Magnetic resonance imaging of the shoulder in asymptomatic professional baseball pitchers. Am J Sports Med. 2002;30:66-73.
14. Connor PM, Banks DM, Tyson AB, Coumas JS, D'Alessandro DF. Magnetic resonance imaging of the asymptomatic shoulder of overhead athletes. Am J Sports Med. 2003;31:724-7.
15. Magee T. MR arthrography of the shoulder: labral and rotator cuff pathology. AJR Am J Roentgenol. 2009;192:86-92.
16. Andrews JR, Wilk KE, Reinold MM. Nonoperative management of shoulder injuries in the overhead athlete. J Orthop Sports Phys Ther. 2009;39:38-54.
17. Escamilla RF, Andrews JR. Shoulder muscle recruitment patterns and related biomechanics during upper extremity sports. Sports Med. 2009;39:569-90.
18. Tate AR, Turner GN, Knab SE, Jorgensen C, Strittmatter A, Michener LA. Risk factors associated with shoulder pain and disability across the lifespan of competitive swimmers. J Athl Train. 2012;47:149-58.
19. Warner JJ, Micheli LJ, Arslanian LE, Kennedy J, Kennedy R. Scapulothoracic motion in normal shoulders and throwing athletes. J Shoulder Elbow Surg. 1992;1:3-12.
20. Martin SD, Warren RF. Current concepts review: suprascapular neuropathy. J Bone Joint Surg Am. 1997;79:471-83.
21. Sanders RJ, Hammond SL, Rao NM. Thoracic outlet syndrome: a review. Neurol Clin. 2013;31:523-39.
22. Fleisig GS, Barrentine SW, Escamilla RF, Andrews JR. Biomechanics of overhand throwing with implications for injuries. Sports Med. 1996;21:421-37.
23. Kuhn JE. Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol. J Shoulder Elbow Surg. 2009;18:138-60.
24. Beard DJ, Rees JL, Cook JA, Rombach I, Cooper C, Merritt N, et al. Arthroscopic subacromial decompression for shoulder impingement syndrome: a multicentre, pragmatic, parallel group, placebo-controlled, three-group, randomised surgical trial. Lancet. 2018;391:329-38.

Cite this article as: Boley JS, Majer MA, Hasou D. Diagnostic pitfalls in shoulder impingement syndrome in overhead athletes: a narrative review. Int J Res Orthop 2026;12:833-6.