Cureus
Part of SPRINGER NATURE

Open Access Original Article

Prevalence and Clinical Associations of Adhesive Capsulitis Among Patients Presenting to a Tertiary Shoulder Clinic: A Cross-Sectional Study

Ghandi Almanasir [1], Ahmad Almigdad [1], Saad Haddad [1], Ahmad A. Almeel [1], Trad Almasaid [1]

1. Department of Orthopaedics and Traumatology, King Hussein Medical City, Amman, JOR

Corresponding author: Ghandi Almanasir, dr_gh_ghandi@yahoo.com

Review began 10/17/2026
Review ended 10/24/2026
Published 11/08/2026

© Copyright 2026
Almanasir et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.119307

Abstract

Background

Adhesive capsulitis (AC) is a debilitating disorder characterized by painful restriction of glenohumeral motion. In tertiary referral centers, patients are frequently referred with MRI reports indicating rotator cuff tears (RCTs). Clinicians may inadvertently attribute symptoms entirely to structural cuff defects, thereby underdiagnosing coexisting AC. This study aimed to determine the prevalence of clinically diagnosed AC among new patients referred to a tertiary shoulder clinic with suspected rotator cuff pathology and to evaluate its relationship with MRI-confirmed RCTs.

Methods

A cross-sectional observational study was conducted at the Shoulder Clinic, Royal Rehabilitation Center, King Hussein Medical City (KHMC), Jordanian Royal Medical Services (JRMS), Amman, Jordan, between July 1, 2026, and October 1, 2026. All consecutive, newly referred adult patients presenting with shoulder complaints were screened. A clinical diagnosis of AC was established independently by two fellowship-trained shoulder surgeons based on restriction of passive range of motion (PROM) in at least two planes of movement. Plain radiographs were obtained for all patients to exclude secondary causes of stiffness, including glenohumeral osteoarthritis, fractures, dislocations, and rotator cuff arthropathy. Shoulder MRI reports were reviewed for structural RCTs. Demographic data and clinical characteristics were analyzed.

Results

A total of 62 consecutive new patients were evaluated (mean age: 55.82 ± 9.49 years; range: 30-82 years; 35 (56.5%) female). Pain was the primary complaint in 52 (83.9%) cases, while the mean symptom duration was 6.92 ± 5.89 months. Clinical evidence of AC (passive motion restriction in ⩾2 planes) was present in 36 patients (58.1%), whereas MRI demonstrated RCTs in 39 patients (62.9%). Among patients with MRI-confirmed RCTs, 23 (59.0%) exhibited concomitant clinical AC. Conversely, among 23 patients without RCTs on MRI, 13 (56.5%) had clinical AC. Chi-square analysis demonstrated no statistically significant association between MRI-diagnosed RCTs and clinical AC ($\chi^2 = 0.036$, $p = 0.850$), with poor diagnostic agreement ($\kappa = 0.024$). No significant associations were observed between RCT status and age, sex, hand dominance, affected side, chief complaint, or symptom duration.

Conclusions

AC is highly prevalent among new patients referred to tertiary shoulder clinics and frequently coexists with radiologically diagnosed rotator cuff pathology. Clinicians must prioritize routine physical examinations emphasizing PROM over sole reliance on MRI reports to avoid diagnostic misattribution and ensure appropriate, targeted management.

Categories: Radiology, Sports Medicine, Orthopedics
Keywords: : adhesive capsulitis, frozen shoulder, jordan, passive range of motion, physical examination, rotator cuff tear, tertiary care

Introduction

Adhesive capsulitis (AC), historically termed "frozen shoulder," is a complex and disabling condition characterized by progressive shoulder pain and profound restriction of glenohumeral range of motion [1]. In the general population, AC has an estimated prevalence of 2% to 5%, peaking in individuals between 40 and 60 years of age, with a slight predilection for females [1, 2]. Although AC can occur as an isolated idiopathic disorder, it frequently coexists with systemic conditions such as diabetes mellitus and thyroid dysfunction or arises secondary to soft-tissue shoulder injuries [3].

The primary diagnostic cornerstone of AC is clinical evaluation, specifically the demonstration of restricted

passive range of motion (PROM) in multiple planes on physical examination, with external rotation and abduction being the most commonly restricted [1, 4]. Despite its distinct clinical presentation, AC is frequently misdiagnosed or overlooked in primary and secondary healthcare settings [1]. In everyday clinical practice, patients presenting with chronic shoulder pain and motion loss are routinely referred for advanced cross-sectional imaging, specifically MRI. Because age-related degenerative rotator cuff tears (RCTs) are extremely common, often existing as asymptomatic structural alterations in middle-aged and elderly individuals, the identification of an RCT on MRI frequently leads clinicians to attribute all presenting symptoms solely to the cuff lesion [5, 6].

Furthermore, neck and shoulder symptoms can occasionally indicate a severe underlying disease, such as a Pancoast tumor, illustrating the critical need to thoroughly reassess patients when clinical manifestations are discordant with imaging findings [7].

Consequently, patients are often referred to specialized tertiary clinics with a single diagnostic label of "rotator cuff tear." During the waiting period for specialized tertiary evaluation and MRI processing, patients may either remain untreated or receive physical therapy protocols tailored specifically for rotator cuff repair or strengthening rather than capsular stretching and mobilization [8]. Treating an inflamed, contracted shoulder capsule using a rotator cuff protocol can exacerbate inflammation, worsen pain, and prolong morbidity [9].

The Shoulder Clinic at King Hussein Medical City (KHMC), operating within the Jordanian Royal Medical Services (JRMS), serves as the primary tertiary referral center for specialized orthopedic shoulder care in Jordan. Receiving complex referrals from all JRMS regional hospitals across the Kingdom, KHMC manages a broad population of patients presenting with refractory shoulder disorders [10].

The primary objective of this cross-sectional study was to investigate the prevalence of clinically verified AC among new patients referred to this tertiary shoulder clinic, assess its co-occurrence with MRI-diagnosed RCTs, and highlight the paramount importance of standardized physical examination, specifically PROM assessment, over sole reliance on cross-sectional radiologic reporting.

Materials And Methods

Study design and setting

This cross-sectional observational study was conducted at the specialized Shoulder Clinic within the Royal Rehabilitation Center at KHMC, JRMS, Amman, Jordan. KHMC represents the primary tertiary care center for the JRMS, which is the largest healthcare provider network in Jordan, delivering primary, secondary, and tertiary medical services to military personnel, their dependents, and civilian referrals throughout the Kingdom [9]. Data collection took place over a consecutive three-month period from July 1, 2026, to October 1, 2026. Institutional ethics approval was obtained from the Royal Medical Services Institutional Review Board (IRB) prior to study initiation.

Ethics approval and informed consent

This study was approved by the IRB of the Royal Medical Services (Amman, Jordan, approval# 13/2026). All procedures were conducted in accordance with the ethical standards of the institutional research committee and the 1964 Declaration of Helsinki and its subsequent amendments. Written informed consent was obtained from all participants prior to inclusion in the study.

Patient selection and screening

The target population comprised all consecutive, newly referred adult patients presenting to the tertiary shoulder clinic for their initial evaluation during the three-month study period. Eligible participants were specifically those presenting with shoulder complaints who had undergone a formal MRI scan of the affected shoulder, yielding a final consecutive cohort of 62 patients.

The primary outcome of the study was the clinical prevalence of AC. As a prespecified secondary objective, demographic and clinical characteristics were also evaluated according to RCT status to assess coexisting structural abnormalities within this tertiary referral cohort.

Inclusion and exclusion criteria

The study targeted all consecutive, newly referred adult patients aged 18 years or older presenting to the tertiary shoulder clinic for their initial evaluation during the study period. Eligible participants were required to have shoulder pain, functional restriction, or suspected rotator cuff pathology, supported by a standard multiplanar shoulder MRI scan reviewed and reported by a dedicated musculoskeletal radiologist, along with complete clinical physical examination data recorded at the initial visit.

Patients were excluded if they had a history of previous surgical intervention or arthroscopy on the index

shoulder; radiographic evidence of osseous glenohumeral osteoarthritis; acute or malunited fractures; glenohumeral dislocation or instability; advanced RCT arthropathy (Hamada grade ⩾2, as defined by Hamada K et al. [11]); neurological deficits affecting the upper limb (such as cervical radiculopathy, brachial plexus injury, or stroke); inflammatory arthropathies, including rheumatoid arthritis or ankylosing spondylitis; incomplete clinical records; or an inability to participate in a standardized PROM examination. Cervical radiculopathy remained a key differential consideration when shoulder symptoms were accompanied by cervical or neurological findings [12].

Clinical assessment and diagnostic criteria

Every enrolled patient underwent a standardized, prospective physical examination conducted independently by two fellowship-trained orthopedic shoulder surgeons. PROM was measured in degrees using a standard goniometer (Baseline, Fabrication Enterprises Inc., White Plains, NY, USA), with the patient seated upright and the scapula stabilized. Evaluated parameters included passive glenohumeral abduction; passive forward flexion; passive external rotation at 0° of abduction (evaluated with the elbow flexed to 90° and the arm at the side); passive external rotation at 90° of abduction (evaluated with the shoulder abducted to 90° in the coronal plane and the elbow flexed to 90°); and passive internal rotation (evaluated with the elbow flexed as the arm was placed posteriorly behind the back, quantified by the highest anatomical vertebral level reached by the tip of the extended thumb).

Clinical AC was defined as painful restriction of passive ROM in at least two distinct movement planes compared with the contralateral asymptomatic side, characterized by a loss of ⩾50% or a deficit of >30° (or an equivalent vertebral level loss in internal rotation). Restriction of passive external rotation at 0° of abduction served as the primary diagnostic criterion, while restriction in forward flexion, abduction, or internal rotation provided the second required qualifying plane. Deficits in active range of motion alone were not used to establish the diagnosis. Standard true anteroposterior (Grashey view), axillary lateral, and scapular-Y plain radiographs were obtained for all patients at study entry to rule out osseous mechanical causes of motion restriction.

Radiological evaluation

All participants underwent a diagnostic 1.5-Tesla or 3.0-Tesla noncontrast shoulder MRI performed prior to or during the initial evaluation. Diagnostic reports issued by qualified musculoskeletal radiologists were reviewed, and rotator cuff integrity was categorized. Rotator cuff status was classified dichotomously.

RCT Present

Defined as full-thickness or partial-thickness structural defects involving the supraspinatus, infraspinatus, subscapularis, or teres minor tendons.

RCT Absent

Defined as intact tendons, tendinosis, or subacromial bursitis without a structural tear.

Data variables collected

Demographic and clinical parameters were documented using a structured protocol. Collected variables included patient age (analyzed continuously and categorized into <40, 40-60, and >60 years), biological sex, hand dominance, affected shoulder side, primary chief complaint (pain versus motion limitation), and symptom duration in months prior to tertiary evaluation. The structured data collection protocol and questionnaire were independently developed by the authors in the Arabic language; a translated copy is provided in the Appendices.

Statistical analysis

Continuous variables (age and symptom duration) were expressed as means ± SDs and ranges, while categorical variables were summarized as absolute frequencies and percentages. The primary outcome was the clinical prevalence of AC, and prespecified secondary analyses evaluated baseline demographic and clinical characteristics stratified by RCT status.

The association between MRI-diagnosed RCTs and clinically diagnosed AC was evaluated using 2 × 2 contingency tables, unadjusted ORs with 95% CIs, and Fisher's exact test. For cross-tabulations of categorical variables across groups, Pearson's chi-square test (χ^2) was applied; Fisher's exact test was used when expected cell counts were less than 5. Continuous variables (age and symptom duration) were compared using the independent-samples t-test. Symptom duration was reported as mean ± SD to facilitate comparison with established orthopedic literature, while taking its distributional properties into account during interpretation. Two-tailed p-values <0.05 were considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA).

Results

Demographic and clinical characteristics

A total of 62 consecutive new patients met the eligibility criteria and were included in the final analysis. The baseline demographic and clinical characteristics of the study cohort are presented in Table *1*.

Variables	Categories	Frequency	Percent (%)	Mean (SD)
Duration of symptoms (months)	Range: 1-36	-	-	6.92 (5.89)
Age (years)	Range: 30-82	-	-	55.82 (9.49)
Age groups	<40 years	3	4.8	-
	40-60 years	38	61.3	-
	>60 years	21	33.9	-
Sex	Female	35	56.5	-
	Male	27	43.5	-
Dominant hand	Left	15	24.2	-
	Right	47	75.8	-
Affected side	Left	32	51.6	-
	Right	30	48.4	-
Chief complaint	Limitation in ROM	10	16.1	-
	Pain	52	83.9	-
Rotator cuff tear on MRI	No	23	37.1	-
	Yes	39	62.9	-
Clinical evidence of adhesive capsulitis	No	26	41.9	-
	Yes	36	58.1	-

TABLE 1: Baseline demographic and clinical characteristics of the study cohort (N = 62).

ROM: Range of motion.

The mean age of the cohort was 55.82 ± 9.49 years (range: 30-82 years), with the majority of patients (61.3%, n = 38) aged 40-60 years. Females accounted for 56.5% (n = 35) of the cohort, while males accounted for 43.5% (n = 27). Right-hand dominance was reported in 75.8% (n = 47) of patients. The left shoulder was affected in 51.6% (n = 32) of cases, while the right shoulder was affected in 48.4% (n = 30).

The mean duration of symptoms prior to consultation at the tertiary shoulder clinic was 6.92 ± 5.89 months (range: 1-36 months). Pain was cited as the primary chief complaint by 83.9% (n = 52) of patients, whereas limitation in range of motion was reported as the primary chief complaint by only 16.1% (n = 10).

Prevalence of AC and RCTs

Clinical examination by shoulder specialists established evidence of AC in 36 of 62 patients (58.1%) within this study cohort. A review of shoulder MRI reports confirmed structural RCTs in 39 of 62 patients (62.9%).

Association between RCTs and AC

The cross-tabulation between MRI-diagnosed RCTs and clinically confirmed AC is detailed in Table *2*.

Rotator cuff tear on MRI	Clinical AC: No	Clinical AC: Yes	Total	Association/test statistic
No	10 (43.5%)	13 (56.5%)	23 (100.0%)	
Yes	16 (41.0%)	23 (59.0%)	39 (100.0%)	$\chi^2 = 0.00$, $p = 1.00$; OR = 1.11 (95% CI: 0.40-3.08)
Total	26 (41.9%)	36 (58.1%)	62 (100.0%)	

TABLE 2: Prevalence of adhesive capsulitis and rotator cuff tears.

Cross-tabulation and concordance between MRI-diagnosed rotator cuff tears and clinically diagnosed adhesive capsulitis.

AC: Adhesive capsulitis.

Values are presented as n (row percentage).

Among the 39 patients with MRI-confirmed RCTs, 23 (59.0%) demonstrated coexisting clinical evidence of AC, while 16 (41.0%) had isolated cuff tears without global passive stiffness. Conversely, among the 23 patients without RCTs on MRI, 13 (56.5%) exhibited clinical AC, and 10 (43.5%) had neither condition.

Chi-square testing demonstrated no statistically significant association between the presence of an MRI-diagnosed RCT and the clinical presence of AC ($\chi^2 = 0.00$, $p = 1.00$). Evaluation using an unadjusted effect estimate yielded an odds ratio of 1.11 (95% CI: 0.40-3.08), indicating that the presence of a RCT on MRI was not significantly associated with the clinical manifestation of AC.

Subgroup analysis of associated clinical variables

A subgroup comparison of clinical and demographic variables according to RCT status is summarized in Table *3*.

Variables	Categories	RCT absent (n = 23)	RCT present (n = 39)	Test value*	p-value
Sex	Female	14 (60.9)	21 (53.8)	$\chi^2 = 0.290$	0.59
	Male	9 (39.1)	18 (46.2)		
Age groups	<40 years	1 (4.3)	2 (5.1)	F = 4.668†	0.097
	40-60 years	18 (78.3)	20 (51.3)		
	>60 years	4 (17.4)	17 (43.6)		
Dominant hand	Left	5 (21.7)	10 (25.6)	$\chi^2 = 0.120$	0.729
	Right	18 (78.3)	29 (74.4)		
Affected side	Left	14 (60.9)	18 (46.2)	$\chi^2 = 1.225$	0.263
	Right	9 (39.1)	21 (53.8)		
Chief complaint	Limitation in ROM	4 (17.4)	6 (15.4)	$\chi^2 = 0.043$	0.836
	Pain	19 (82.6)	33 (84.6)		
Clinical evidence of adhesive capsulitis	No	10 (38.5)	16 (61.5)	$\chi^2 = 0.036$	0.85
	Yes	13 (36.1)	23 (63.9)		
Duration of symptoms (months)	Mean (SD)	8.22 (7.45)	6.15 (4.69)	t = 1.341	0.185

TABLE 3: Subgroup analysis of associated clinical variables.

Note: Categorical variables are presented as n (%), and continuous variables are presented as mean (SD). Percentages are calculated based on column totals (n = 23 for RCT absent; n = 39 for RCT present).

* Statistical test symbols: χ^2 = Pearson's chi-square test; t = independent-samples t-test.
† The age-group comparison ($\chi^2 = 4.668$, p = 0.097) was evaluated using Pearson's chi-square test.

RCT: Rotator cuff tear; ROM: Range of motion.

No statistically significant associations were found between MRI-confirmed RCTs and sex (p = 0.590), age groups (p = 0.097), hand dominance (p = 0.729), affected shoulder side (p = 0.263), or chief presenting complaint (p = 0.836). Similarly, the mean symptom duration did not differ significantly between patients without cuff tears (8.22 ± 7.45 months) and those with cuff tears (6.15 ± 4.69 months; t = 1.341, p = 0.185).

Discussion

Key findings and clinical interpretation

The main finding of this study is the high clinical prevalence of AC (58.1%) among new patients presenting to a tertiary shoulder clinic in Jordan. Importantly, nearly 60% of patients with radiologically confirmed RCTs had concomitant clinical AC. Statistical evaluation using 2 × 2 contingency testing demonstrated no significant association between the presence of an MRI-diagnosed RCT and the clinical presence of AC (OR = 1.11, p = 1.00). These results demonstrate that structural tendon defects identified on cross-sectional imaging do not reliably predict, explain, or rule out global passive shoulder restriction, reinforcing that AC presents as a distinct clinical entity whose manifestation is independent of structural rotator cuff tearing.

Pathophysiology, histology, and anatomy of AC

To understand why AC develops independently of or alongside RCTs, its distinct histopathological profile must be considered. Histologically, AC involves matrix metalloproteinase-mediated synovial inflammation followed by dense, nodular fibroblastic and myofibroblastic proliferation resembling Dupuytren-like fibromatosis [1, 2]. Progressive type I and type III collagen deposition leads to capsular thickening, hypervascular hyperplastic synovitis, and elevated levels of pro-inflammatory and fibrotic cytokines, including transforming growth factor-beta, tumor necrosis factor-alpha, and IL-1 beta [2, 3]. Anatomically, the process targets specific microstructures: the rotator interval, comprising the coracohumeral and superior glenohumeral ligaments, where contracture restricts passive external rotation with the arm at the side [4, 5], and the axillary recess, where contracture of the inferior glenohumeral ligament complex limits overall abduction and elevation [4, 5].

Etiological theories, stages, and risk factors

The etiology of AC is multifactorial, involving autoimmune, vascular, metabolic, and neurogenic mechanisms [3, 6]. Microtrauma or underlying rotator cuff tendinopathy can initiate localized capsular inflammation in susceptible individuals [3, 5]. Clinically, the condition progresses through four stages: a pre-adhesive inflammatory stage presenting with severe pain and guarded motion [4]; a freezing stage marked by hypervascular synovitis, capsular fibroplasia, severe night pain, and progressive stiffness lasting 3 to 9 months [4, 7]; a frozen stage characterized by quiescent inflammation and rigid capsular fibrosis lasting 9 to 15 months [4, 7]; and a thawing stage defined by capsular remodeling and gradual recovery of motion over 15 to 24 months or longer [4, 6]. Key risk factors include diabetes mellitus, where advanced glycation end products accelerate collagen cross-linking, thyroid dysfunction, dyslipidemia, cardiovascular disease, prolonged post-traumatic immobilization, and prior neck or breast surgery [3, 4, 8].

Diagnostic unreliability of MRI and clinical misdirection

Although dedicated musculoskeletal MRI protocols can demonstrate validated diagnostic features of adhesive capsulitis, such as coracohumeral ligament thickening (>4 mm), axillary recess capsular thickening (>4 mm), T2 hyperintensity in the rotator interval, and subcoracoid fat obliteration with high sensitivity and specificity [8, 9], routine noncontrast MRI scans performed outside specialized tertiary centers frequently prioritize structural tendon evaluation over subtle capsular changes. Consequently, routine imaging reports may indicate normal capsular findings in clinically stiff shoulders [9]. Conversely, MRI readily identifies age-related structural alterations, such as RCTs, creating search-fulfillment bias, whereby both the radiologist and referring clinician focus exclusively on the visible tendon lesion [8, 9].

RCTs are common in asymptomatic individuals over the age of 50, often representing normal age-related degeneration rather than acute pain generators [8, 10]. Pain from early adhesive capsulitis is typically severe, unremitting, and nocturnal [4, 7]. In contrast, pain from chronic degenerative RCTs is usually insidious, activity-related, localized to the deltoid insertion, and initially preserves PROM [10, 11]. When a patient with early adhesive capsulitis receives an MRI report noting a RCT, primary care providers and non-specialists frequently attribute all symptoms to the tear alone [11]. This misattribution delays targeted capsular therapy [11, 12] and often leads to inappropriate physiotherapy protocols focused on eccentric strengthening and active range of motion within painful arcs [12, 13]. In an inflamed, contracted capsule, aggressive active strengthening without prior passive mobilization can exacerbate inflammation, increase pain, and worsen joint contracture [12, 13].

Management strategies and effects of intra-articular corticosteroids

Early recognition of adhesive capsulitis allows for prompt nonoperative interventions, including gentle capsular stretching, hydrodilatation, and intra-articular corticosteroid injections [14]. Intra-articular steroid administration rapidly suppresses inflammatory cytokines, relieves pain, and shortens the freezing phase [3, 2, 5]. While intra-articular corticosteroid injections effectively reduce pain and shorten the freezing phase of adhesive capsulitis [15], clinical guidelines emphasize that potential benefits must be weighed against tendon pathology, injection frequency, and surgical plans, as repeated or intratendinous administration carries theoretical risks to tendon integrity [13, 14, 16]. Resolving capsular contracture first is essential; proceeding directly to arthroscopic rotator cuff repair on a stiff, inflamed shoulder substantially increases the risk of severe postoperative arthrofibrosis and poor functional outcomes [12, 13, 14]. From a rehabilitation perspective, a clear distinction must be maintained between symptom-provoking excessive mechanical loading, which can exacerbate acute capsular inflammation, and appropriately graded, low-load strengthening and range-of-motion protocols tailored to the patient's irritability stage. Initial physical therapy should prioritize pain-free passive stretching, with progressive loading introduced only as acute inflammatory symptoms diminish [14].

Strengths and limitations

This study has notable strengths. It addresses a real-world diagnostic challenge within the largest national healthcare network in Jordan [15]. Clinical evaluations were conducted independently by fellowship-trained shoulder surgeons using standardized passive range-of-motion criteria, reducing diagnostic ambiguity. Additionally, plain radiographs were routinely obtained to exclude secondary osseous causes of stiffness.

Several limitations of this study should be acknowledged. First, although physical examinations were performed independently by two fellowship-trained orthopedic shoulder surgeons, formal prospective documentation regarding blinding to MRI reports, mutual examiner blinding, inter-examiner disagreement counts, and standardized consensus protocols was not recorded, preventing retrospective calculation of interobserver reliability metrics. Second, the sample size of 62 patients was relatively small, reflecting a single-center, consecutive three-month cross-sectional study period. Because the study was conducted at a specialized tertiary care referral center, the cohort represents a selected patient population with persistent or complex shoulder symptoms, which may overestimate clinical prevalence compared with primary care settings and limit direct generalizability to the broader population [10]. Furthermore, this sample size (N = 62) may have restricted statistical power to detect subtle clinical associations; nonsignificant statistical findings should therefore be interpreted as a lack of observed evidence within this cohort rather than

definitive proof of no association. Additionally, symptom duration exhibited a wide range (1-36 months) and variance across groups; while parametric testing was retained for consistency with existing literature, the nonparametric distributional properties inherent in clinical duration data should be considered when interpreting group comparisons. Finally, metabolic parameters such as glycated hemoglobin levels and lipid profiles were not uniformly available across all patient records for multivariable risk modeling. Prospective, multicenter studies with larger cohorts and longitudinal follow-up are needed to evaluate how early primary care screening of PROM impacts referral timelines, resource utilization, and patient-reported outcomes.

Conclusions

AC frequently affects patients presenting to specialized tertiary shoulder clinics and often coexists with radiologically confirmed rotator cuff pathology. Crucially, structural tendon defects identified on cross-sectional imaging do not reliably predict or correlate with clinical joint stiffness. Clinicians should not rely solely on imaging reports to evaluate shoulder pain. Prioritizing routine physical examinations that assess PROM, especially external rotation and abduction, is essential for every patient presenting with shoulder complaints. Recognizing this overlap prevents inappropriate or misdirected physical therapy, avoids unnecessary delays, and ensures the timely implementation of capsular-targeted management.

Appendices



Shoulder Clinic Questionnaire

*** **Patient Consent:**
I voluntarily agree to participate in this questionnaire regarding my shoulder condition. I consent to the use of the information I provide, together with relevant data from my medical records, for research purposes. I understand that my data will be handled confidentially and in accordance with applicable ethical and data protection requirements.

*** **Patient Section:**
Please complete the following questionnaire by answering the questions in the patient section. Your answers should reflect your own experience and symptoms related to your shoulder condition.

Patient part:

National ID: .....

DOB: .....

Gender:

☐ Male ☐ Female

Main complaint:

☐ Shoulder pain ☐ Limitation in shoulder motion

Side affected:

☐ Right ☐ Left

Dominant hand:

☐ Right ☐ Left

Duration of symptoms (Months): .....

Doctor part

RCT on MRI? ☐ Yes ☐ No

Clinical evidence of Adhesive capsulitis? ☐ Yes ☐ No

FIGURE 1: Questionnaire (translated from Arabic).

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Ghandi Almanasir, Ahmad Almigdad, Saad Haddad, Ahmad A. Almeel, Trad Almasaid

Acquisition, analysis, or interpretation of data: Ghandi Almanasir, Ahmad Almigdad, Saad Haddad, Ahmad A. Almeel, Trad Almasaid

Drafting of the manuscript: Ghandi Almanasir, Ahmad Almigdad, Saad Haddad, Ahmad A. Almeel, Trad Almasaid

Critical review of the manuscript for important intellectual content: Ghandi Almanasir, Ahmad Almigdad, Saad Haddad, Ahmad A. Almeel, Trad Almasaid

Supervision: Ghandi Almanasir, Ahmad Almigdad

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Pharmaceutical, Clinical Research, Studies, and Professional Ethics Committee, Jordanian Royal Medical Services issued approval 13/2026. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Kelley MJ, Shaffer MA, Kuhn JE, et al.: Shoulder pain and mobility deficits: adhesive capsulitis . J Orthop Sports Phys Ther. 2013, 43:A1-A31. 10.2519/jospt.2013.0302
2. Le HV, Lee SJ, Nazarian A, Rodriguez EK: Adhesive capsulitis of the shoulder: review of pathophysiology and current clinical treatments. Shoulder Elbow. 2017, 9:75-84. 10.1177/1758573216676786
3. Kingston K, Curry EJ, Galvin JW, Li X: Shoulder adhesive capsulitis: epidemiology and predictors of surgery . J Shoulder Elbow Surg. 2018, 27:1437-1443. 10.1016/j.jse.2018.04.004
4. Minagawa H, Yamamoto N, Abe H, et al.: Prevalence of symptomatic and asymptomatic rotator cuff tears in the general population: from mass-screening in one village. J Orthop. 2013, 10:8-12. 10.1016/j.jor.2013.01.008
5. Cho CH, Bae KC, Kim DH: Treatment strategy for frozen shoulder . Clin Orthop Surg. 2019, 11:249-257. 10.4055/cios.2019.11.3.249
6. Lho YM, Ha E, Cho CH, Song KS, Min BW, Bae KC, Lee KJ: Inflammatory cytokines and cell proliferation in adhesive capsulitis. J Shoulder Elbow Surg. 2013, 22:572-578. 10.1016/j.jse.2012.06.014
7. Chu EC, Trager RJ, Shum JS, Lai CR: Pancoast tumor presenting as neck pain in the chiropractic office: a case report and literature review. Am J Case Rep. 2022, 23:e937052. 10.12659/AJCR.937052
8. Hannafin JA, Chiaia TA: Adhesive capsulitis: a treatment approach . Clin Orthop Relat Res. 2000, 372:95-109. 10.1097/00003086-200003000-00012
9. Suh CH, Yun SJ, Jin W, Lee SH, Park SY, Park JS, Ryu KN: Systematic review and meta-analysis of magnetic resonance imaging features for diagnosis of adhesive capsulitis of the shoulder. Eur Radiol. 2019, 29:566-577. 10.1007/s00330-018-5604-y
10. Al-omari AA, Aleshawi AJ, Abuzaid HM, Al-Obeidat FA: Patterns of shoulder pathology among patients attending tertiary orthopedic clinics in Jordan. Jordan Med J. 2021, 55:101-110.
11. Hamada K, Yamanaka H, Uchida T, Mikasa M, Tak DS: Roentgenographic findings in massive rotator cuff tears. A long-term observation. Clin Orthop Relat Res. 1990, 254:92-96. 10.1097/00003086-199005000-00014
12. Chu EC, Ng L: Dystonic tremor as an atypical presentation of cervical radiculopathy . Cureus. 2024, 16:e51441. 10.7759/cureus.51441
13. Keener JD, Galatz LM, Teefey SA, et al.: A prospective evaluation of survivorship of asymptomatic degenerative rotator cuff tears. J Bone Joint Surg Am. 2015, 97:89-98. 10.2106/JBJS.N.00099
14. Griggs SM, Ahn A, Green A: Idiopathic adhesive capsulitis: a prospective functional outcome study of nonoperative treatment. J Bone Joint Surg Am. 2000, 82:1398-1407. 10.2106/00004623-200010000-00005
15. Hand C, Clipsham K, Rees JL, Carr AJ: Long-term outcome of frozen shoulder . J Shoulder Elbow Surg. 2008, 17:231-236. 10.1016/j.jse.2007.05.009
16. Coombes BK, Bisset L, Vicenzino B: Efficacy and safety of corticosteroid injections and other injections for management of tendinopathy: a systematic review of randomised controlled trials. Lancet. 2010, 376:1751-1767. 10.1016/S0140-6736(10)61160-9