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Value of MRI examination in diagnosis of rotator cuff injury with acromioclavicular disk detachment: A case report

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► ***Case report***

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ABSTRACT

Background: The acromioclavicular (AC) disk is a potential source of pain in the acromion and plays a critical role in stabilizing the acromioclavicular joint as well as facilitating normal shoulder joint function. Although the majority of existing studies focus on AC joint dislocation injuries, only a limited number of cases in the literature have reported AC disk dislocation occurring concomitantly with rotator cuff injury. To the best of our knowledge, this is the first reported case of rotator cuff injury associated with complete detachment of the AC disk. ***Case presentation:*** A healthy 53-year-old woman presented with a supraspinatus tendon tear and subacromial impingement following a fall and was subsequently admitted for evaluation and management. Preoperative imaging - including a shoulder "Y"-view radiograph and a chest radiograph - revealed no abnormalities of the acromioclavicular (AC) joint. Subsequent MRI demonstrated discontinuity of the supraspinatus tendon signal, along with a region of high signal intensity beneath the AC joint and a low-signal-intensity area at the inferomedial attachment site - findings that were consistent with the normal signal characteristics of the AC joint articular disk. ***Conclusions:*** Our case demonstrates in detail that shoulder pain originating from the acromioclavicular joint must not be overlooked during the diagnostic evaluation of rotator cuff injury. Furthermore, MRI holds significant clinical utility in detecting and diagnosing acromioclavicular disk dislocation injuries.

INTRODUCTION

In contemporary clinical practice, rotator cuff injury - particularly tear (RCT) - ranks highly among the factors responsible for shoulder discomfort. Frequently resulting in restricted upper-limb mobility, diminished work capacity, and reduced quality of life. With the accelerating aging of the population and increased national engagement in physical activity - particularly among middle-aged and older adults and individuals subjected to high shoulder loading - the incidence of RCT is rising. Notably, women are disproportionately affected [1]. Concurrently, diagnostic and therapeutic strategies for RCT continue to evolve in response to advancing clinical evidence and technological innovation. Shoulder pain in RCT is rarely attributable solely to rotator cuff musculotendinous injury; rather, it often coexists with pathology involving multiple adjacent structures, such as the subacromial region, the coracoid process together with its adjacent ligamentous structures, and the proximal tendon of the long biceps head. Importantly, acromioclavicular joint (ACJ)-related pathology is frequently overlooked during the evaluation and management of RCT. A substantial proportion of patients with ACJ injury continue to experience persistent symptoms following surgical intervention for RCT, with pain remaining the predominant clinical manifestation of treatment failure [2]. A potential source of refractory ACJ pain is the intra-articular disk.

The anatomical configuration of this disk exhibits marked interindividual variability: neither its size nor its morphological architecture follows a fixed pattern. Such heterogeneity arises from diverse combinations of acromial and clavicular morphotypes, giving rise to multiple disk types [3]. From a tissue embryological perspective, the ACJ disk shares homology with the meniscus. Although prior studies have demonstrated that, with advancing age - particularly during mid-adulthood - this meniscus-like structure undergoes rapid degeneration and functional decline [4–7], significant individual variation persists. Notably, the ACJ disk has been confirmed to be a complete, disk-shaped structure within the hook-vertebra (i.e., acromioclavicular) joint and is innervated by sensory nerve fibers [8].

This paper reports a rare case of rotator cuff injury accompanied by spontaneous detachment of the acromioclavicular joint (ACJ) disk. This report indicates that a discoid intra-articular structure within the ACJ may serve as a significant pain generator. Notably, such a cause is often underrecognized in the context of refractory ACJ discomfort. Preoperative failure to detect ACJ discoid pathology constitutes a key etiological factor

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underlying persistent postoperative pain following rotator cuff repair. By presenting anatomical evidence demonstrating sensory innervation of the ACJ disk, this study establishes a pathophysiological link between disk injury and residual pain after rotator cuff tear surgery - thereby challenging the traditional, tendon-centric paradigm that has historically attributed shoulder pain primarily to rotator cuff tendinopathy, subacromial impingement, or related structures.

In terms of differential diagnosis, this finding facilitates individualized assessment of shoulder pain and helps prevent misdiagnosis as recurrent rotator cuff tear, synovial hyperplasia, or intra-articular loose bodies - common entities frequently considered in clinical practice. Consequently, diagnostic accuracy for complex, recalcitrant shoulder pain is improved.

This conceptual advancement shifts the clinical reasoning framework from a narrow 'single-tendon-focused evaluation' toward a comprehensive, multi-structural assessment of the shoulder joint, offering a novel direction for optimizing diagnostic and therapeutic workflows.

CASE PRESENTATION

A 53-year-old woman presented to the hospital with left shoulder pain and restricted range of motion, with symptom onset one week prior to admission. Physical examination revealed marked tenderness beneath the acromion and over the acromioclavicular (AC) joint. Active range of motion of the left shoulder was significantly impaired: forward flexion and abduction were both <60°; elevation, adduction, and extension were not achievable; internal rotation reached only T12 level (40°), and external rotation was limited to 15°. Hawkins–Kennedy sign, Gerber's lift-off test, and O'Brien's test were all positive. The patient was unable to fully cooperate with additional physical examinations due to pain. Muscle strength and tone in all four limbs were normal, and distal sensation and peripheral circulation remained intact. The patient reported a visual analog scale (VAS) score of 7/10 for pain.

In the preoperative imaging studies, the shoulder's "Y"-view radiograph as well as the chest X-ray showed no signs of abnormalities in the acromioclavicular joint (figure 1). Magnetic resonance imaging (MRI) of the left shoulder demonstrated high-signal intensity between the acromion and the AC joint. MRI examinations were performed using a 1.5-T superconducting MRI system (MAGNETOM, Siemens Healthineers, Erlangen, Germany). Standard shoulder MRI sequences, including T1-weighted, T2-weighted fat-suppressed, and proton density-weighted images, were acquired. Plain radiographs were obtained using a digital radiography system (Shimadzu Corporation, Kyoto, Japan) according to the routine institutional shoulder imaging protocol. Image interpretation was performed on the hospital PACS workstation.

On the oblique coronal sequence, multiple findings were observed: (1) free intra-articular cartilaginous bodies (red arrow) located beneath the AC joint surface; (2) joint effusion within the AC joint capsule (green arrow); and (3) discontinuity of the supraspinatus tendon (white arrow) (figure 2). On March 27, 2026, the patient underwent arthroscopic debridement, rotator cuff repair, and acromioplasty. The procedure was performed with the patient positioned in the lateral decubitus position. Standard arthroscopic portals - including the posterior, anterior, anterolateral, and lateral approaches - were utilized. Arthroscopic exploration revealed inflammatory synovial hyperplasia within the glenohumeral joint; the subscapularis muscle was intact, and the biceps pulley complex remained anatomically preserved. The supraspinatus tendon exhibited severe superficial fraying.

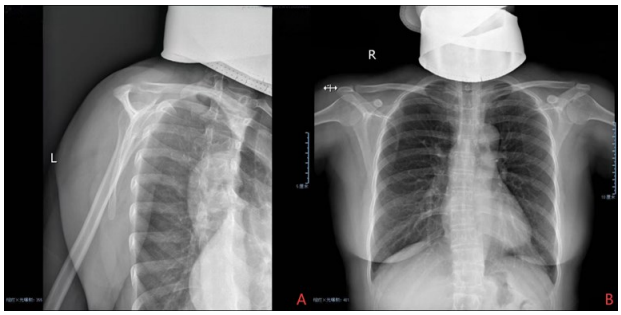


Figure 1. Preoperative imaging. A Shoulder "Y" view; B Chest radiograph. No abnormality of the acromioclavicular joint is seen.

Additionally, inflammatory synovial hyperplasia was observed beneath the acromion, accompanied by partial discontinuity of the acromion-descending capsule. The inferior surface of the acromion demonstrated mild irregularity along its anterior and lateral margins. These areas were meticulously debrided to restore a smooth contour. The acromion-descending capsule and inflamed synovium were thoroughly excised. Further exploration beneath the acromioclavicular (AC) joint identified an irregular, free intra-articular body measuring 0.5 × 0.5 cm. Its superior margin was adherent to the proximal clavicle. Due to instability and inability to retrieve it intact with a probe, the fragment was carefully dissected and removed enbloc. A high-speed burr and arthroscopic planer were then employed to resect the prominent bony overgrowth, thereby smoothing the inferior acromial surface. Concurrently, the supraspinatus tendon was repaired using standard suture-bridge techniques. At the 3-day and 1-month postoperative follow-ups, the patient reported marked pain relief. The Visual Analog Scale (VAS) score decreased to 1. Active shoulder flexion and abduction improved to 90° at 3 days and further

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increased to 120° at 1 month. Hawkins–Kennedy, Gerber (lift-off), and O'Brien's tests were all negative. This case illustrates acute shoulder pain secondary to a combined rotator cuff tear and traumatic AC joint disk dislocation, wherein the displaced disk fragment migrated into the subacromial space—thereby inducing mechanical impingement and inflammation.

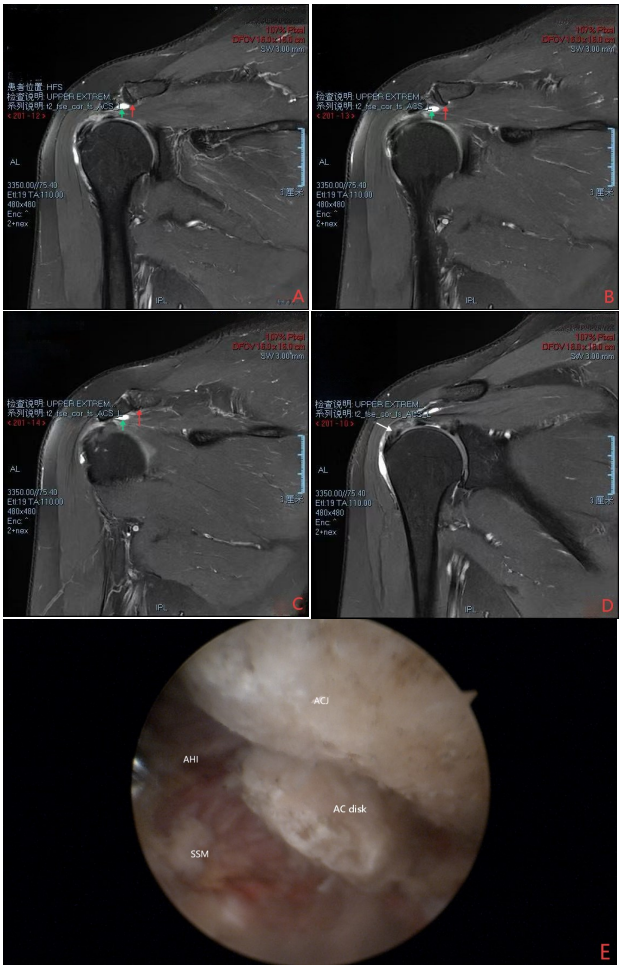


Figure 2. Figures **A**, **B**, and **C**) show the following: On the oblique coronal view of the shoulder joint, high signal intensity is observed within the acromioclavicular joint (ACJ), with the red arrow indicating the AC disk; the green arrow indicates the hyperintense signal in the T2 quadrant inferior to the ACJ. **D**) The white arrow indicates disruption of the supraspinatus muscle (SSM) continuity, consistent with a supraspinatus tear. **E**) A partially free AC disk is visualized intraoperatively.

DISCUSSION

From a clinical angle on injury features, an isolated rotator cuff tear is typically a single soft tissue injury. The pathomechanisms are straightforward. The structural pathology is homogeneous. In contrast, a rotator cuff tear combined with acromioclavicular joint disk dislocation forms a rare and complex shoulder injury pattern. Flores DV and colleagues [9, 10] described in detail the anatomical variations and degenerative changes of the AC joint disk. Studies on cadavers show that the AC joint disk is present in most people. Its morphology varies considerably, with configurations that can be complete, discoid, meniscoid, or merely a rim residual. These findings confirm that this fibrocartilaginous disk is common but structurally diverse. As age advances and mechanical stress accumulates, it becomes more susceptible to fissuring and fragmentation.

For soft tissue injuries involving tendons and cartilage, MRI remains the gold standard. Heers [9] provided a systematic description of MRI findings for the AC joint disk. Disk tears or dislocations show high signal intensity on sequences with fat suppression. Schweitzer M [11] was one of the earliest to highlight the clinical significance of AC joint effusion in shoulder pain patients. He identified abnormal fluid buildup as a direct imaging sign of inflammation and structural damage inside the joint. Moreover, ultrasound has become much more useful for evaluating AC joint disk pathology [12, 13]. Precerutti [14] reviewed the ultrasound techniques for AC joint assessment. He emphasized that dynamic scanning greatly enhances the visualization of disk displacement. In a torn disk, abnormal floating or extrusion within the joint capsule can be directly observed. Grading of AC joint osteoarthritis based on histopathology and imaging demonstrates a strong positive link between rotator cuff tear severity and the extent of joint degeneration [15].

Among patients with massive rotator cuff tears, osteophytes of the AC joint and narrowing of the joint space are extremely common. Surgical findings further support this association. Arthroscopic examination of individuals with full thickness rotator cuff tears reveals a very high prevalence of pathology inside the AC joint. Such pathology includes disk tears, synovitis, and the formation of osteophytes [16]. Overall, an anatomical analysis of the varied morphological types of the AC joint disk points to its built-in structural fragility. The disk is always thin and mechanically unstable, which makes it highly vulnerable to tearing, dislocation, or even impingement within the joint when subjected to trauma. When this condition occurs together with a rotator cuff tendon tear, the combined pathology produces overlapping clinical signs and interconnected disease mechanisms. This worsens pain and loss of function while making diagnosis considerably more difficult. Furthermore, nonsurgical management of these concurrent injuries often leads to poor results.

Currently, there is no agreement, either globally or within individual countries, on how to diagnose and treat simultaneous rotator cuff tears and AC joint disk dislocation. Özer M and Gu F *et al.* [16, 17] suggested that the pattern of AC ligament complex injury is closely linked to disk integrity. Their reports, however, did not discuss whether disk repair during

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surgery is needed. Concerning the causes of pathology around the AC joint, most scholars prefer excision over repair for a disk that is severely damaged and moves freely. They give priority to restoring ligament stability rather than preserving the disk. This structure is viewed as not essential for joint function. Kuhn [18] described six cases of AC joint disk detachment caused by trauma, all treated with surgical removal. However, because the sample was small, no firm conclusions about clinical correlations could be made. Guo [19] reported on shoulder pain caused by synovial chondromatosis of the AC joint. The clinical presentation closely matches that of disk pathology. Full arthroscopic debridement produced consistently satisfactory results. Park *et al.* [20] examined postoperative results for patients with symptomatic AC arthritis and coexisting rotator cuff tears. They compared two surgical approaches: rotator cuff repair alone, and repair with distal clavicle resection (Mumford procedure).

The study confirmed that individuals treated with repair alone, leaving AC joint pathology unaddressed, showed considerably more residual pain and worse function scores. Persistent pain and functional limitation after surgery, when linked to pathology around the AC joint, can be effectively resolved by a second operation that removes loose bodies from within the joint. This finding may point to the key role of the AC joint in transmitting force across the scapulothoracic area. More precisely, when the capsule and disk of the AC joint are damaged, tiny movements increase and the distal clavicle becomes less stable. This leads to abnormal stress transfer to the scapula. These biomechanical changes disrupt the normal shape and movement of the subacromial space. The repaired rotator cuff tendon is then subjected to repeated friction and shear forces, which may cause it to tear again. In the current case, the preoperative MRI showed a high signal zone right below the AC joint. This suggests a rupture of the inferior joint capsule, the likely cause of disk detachment. Pain relief was immediate and significant after intraoperative debridement. This result reinforces the crucial importance of checking AC joint disk integrity, not just the condition of the rotator cuff, in patients undergoing rotator cuff repair. This point is especially relevant for those with preexisting AC arthritis or a prior AC joint dislocation. Doing so can reduce the risk of further revision surgery.

So far, the literature offers no complete description of how to identify, treat, and evaluate outcomes in patients with symptomatic AC joint disk injury not caused by arthritis. In this case series, we present the clinical and imaging features of patients managed for trauma-related symptomatic rotator cuff tears and concurrent AC joint disk pathology. Our results point to an association, not a causal relationship. We examine whether these findings are genuine disease triggers or just incidental events.

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Consent for publication: Written informed consent was obtained from the patient for the publication of the case details and any associated images.

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