Original Research Paper

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Radio-Diagnosis

VARIED MRI SHOULDER FINDINGS IN PATIENTS WITH RESTRICTED ARM MOVEMENT

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ABSTRACT Restricted arm movement is one of the most common cause for which a patient is referred for MRI shoulder scan. The purpose of this study is to review imaging of the rotator interval, glenohumeral joint, supraspinatous tendon and changes of adhesive capsulitis, which are the most common causes of restricted range of arm motion. The rotator cuff muscles cause torque forces moving the humerus, hence rotator cuff tears are often associated with loss of shoulder strength and stability, which are crucial for optimal shoulder function. Magnetic resonance imaging can demonstrate spectrum of rotator cuff abnormalities, abnormalities of the cuff muscles and adjacent structures. Routine MRI of the shoulder without intraarticular administration of gadolinium can be used to diagnose adhesive capsulitis.

KEYWORDS : Rotator cuff, adhesive capsulitis, frozen shoulder, supraspinatus tear

INTRODUCTION

MATERIALS AND METHODS

We studied all patients who were referred with complains of restricted arm movements for MRI shoulder at our institution, between 2022 and 2023. The Institute Ethics Committee approved the study protocol, and a written informed consent was obtained from all subjects.

Subjects and Study Procedures

50 patients were included in the study. The relevant data included age, sex, occupation, presenting complaints, diabetic history and physical examination findings.

MRI SHOULDER was done on SIEMENS MAGNETOM SEMPRA 1.5 TESLA Machine.

Sequences taken were PDFS TSE axial, T2 me2d axial, T2 TSE coronal, PDFS TSE coronal, T1 TSE coronal, T2 TSE STIR coronal, PDFS TSE sagittal and T1 TSE sagittal.

RESULTS

Among the total 50 subjects recruited, 60% were females and 40% were males with a mean age of 64 years.

Adhesive capsulitis was the most prevalent MRI shoulder finding. Other findings that were diagnosed on MRI were supraspinatus tear, which included complete tear with retraction of torn fibers, partial tears along articular surface as well as along footprint, subscapularis tear, supraspinatus and subscapularis tendinopathies, rotator cuff soft tissue, acromioclavicular arthropathy as well as trauma related changes.

DISCUSSION

The shoulder area consists of the acromioclavicular and glenohumeral joints. Glenohumeral joint allows for a diversity of movements making it the most mobile and least stable joint of the human body. The acromioclavicular joint further aids in shoulder abduction and flexion. The shoulder joint comprises of biceps tendon and rotator cuff muscles; glenoid labrum and capsular ligaments. Supraspinatus, subscapularis, infraspinatus, and teres minor make up the rotator cuff complex which maintains the humeral head in the glenoid cavity. With the development of surface coils used in shoulder joint imaging, MRI has become a crucial diagnostic tool having a high-spatial-resolution and multiplanar imaging capability for assessing the shoulder joint, surrounding ligaments, muscles, and soft tissues [1].

Rotator cuff tears (Figures 1a to 1d) are one of the most common causes of restricted range of arm motion in the shoulder joint and are mostly seen in the adult population. The prevalence of tears increases with age, and the cause is mostly degenerative [2]. MRI is the best modality for detecting rotator cuff tears. MR imaging can provide information about rotator cuff tears such as tear size, tear depth or thickness, tendon retraction, that can determine the prognosis and treatment [3]. DeOrio and Cofield classified rotator cuff tears on the basis of greatest dimension as either small (1 cm), medium (1–3 cm), large (3–5 cm), or massive (>5 cm) [4]. Articular-surface partial-thickness rotator cuff tears are more frequent than bursal-surface partial-thickness tears.

A supraspinatus tendon tear may involve the coracohumeral ligament and superior subscapularis tendon fibers, which is associated with high grade supraspinatus atrophy and poor prognosis [5]. Further, the tear can also involve the conjoint tendon.

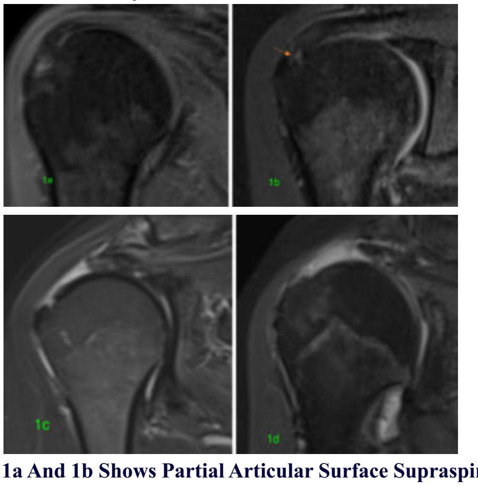

Figure 1a And 1b Shows Partial Articular Surface Supraspinatus Tear. Figure 1c And 1d Shows Complete Supraspinatus Tear With Tendon Retraction.

The shoulder is the most commonly affected joint by calcific tendinitis, predominantly involving supraspinatus tendon. MRI helps to visualize calcific deposits (fig 2a) and their relationship to landmarks on the humeral head. Fluid sensitive MR images frequently show surrounding areas of increased signal intensity compatible with oedema, particularly if imaged during the resorptive phase [6]. Trauma related findings are also one of the common causes of restricted arm movement, of which greater tuberosity avulsion is a common findings which was seen in our study (fig 2b).

The presence of a radiographic greater tuberosity spur, narrow subacromial interval, and subacromial lateral as well as undersurface spurs indicate advanced retraction of the supraspinatus tendon (fig 3a and 3b). In patients with rotator cuff tears, the presence of a spur indicates atrophy and fatty infiltration of the supraspinatus muscle, as well as atrophy of the infraspinatus muscle, which are known to portend poor postoperative functional outcomes. These can be diagnosed with the help of MRI [7].

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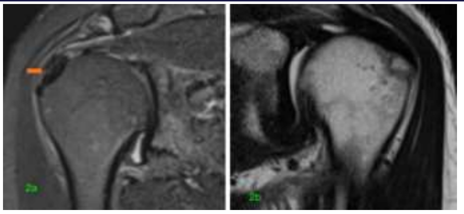

Figure 2a – Calcific Tendinitis; 2b Showing Greater Tuberosity Avulsion.

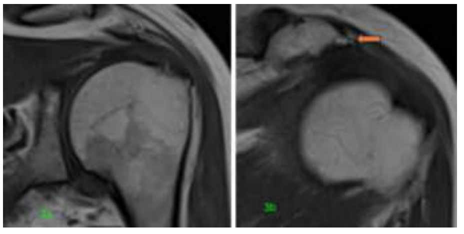

Figure 3: (a) Greater Tuberosity Spur (b) Subacromial Spur.

Chronic acromio-clavicular joint injury shows thickening of acromioclavicular ligament (fig 4a) and widening of joint space.

The subcoracoid bursa is located between the anterior surface of the subscapularis and the coracoid process, extending caudal to the tendon of the coracobrachialis and the short head of the biceps. This bursa does not normally communicate with the glenohumeral joint but may communicate with the subacromial bursa [8]. The subcoracoid bursal fluid (fig 4b) is often seen in patients with rotator cuff injury.

Adhesive capsulitis or "frozen shoulder" is an inflammatory condition of synovium and capsule of the glenohumeral joint leading to a restricted arm motion, commonly seen in female patients who are between 40 and 60 years of age [9]. The presence edematous thickened IGHL / Inferior glenohumeral ligament were found in adhesive capsulitis of the shoulder (fig 5a and 5b) along with abnormal soft tissue thickening within the rotator interval encasing the biceps anchor (fig 5c). MRI, in recent years, allowed for the visualization of several characteristic signs seen with this condition, including thickening of the coracohumeral ligament (fig 5d), axillary pouch and rotator interval joint capsule, in addition to the obliteration of the subcoracoid fat triangle [10].

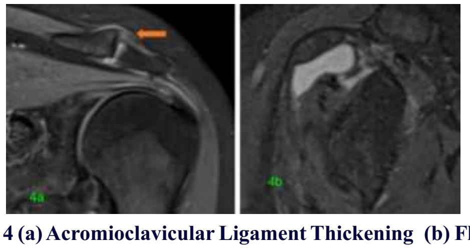

Figure 4 (a) Acromioclavicular Ligament Thickening (b) Fluid In Subcoracoid Recess

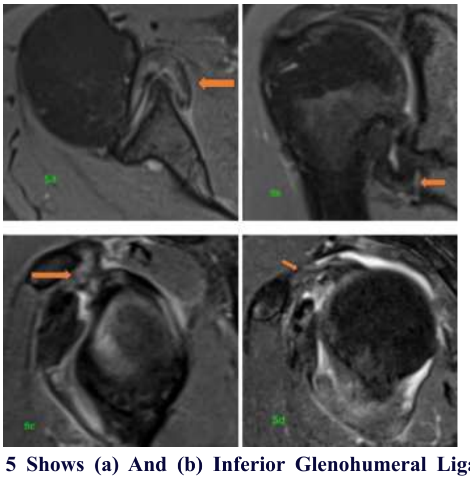

Figure 5 Shows (a) And (b) Inferior Glenohumeral Ligament Thickening, (c) Shows Soft Tissue In Rotator Cuff Interval And (d) Coracohumeral Ligament Thickening.

Rotator cuff pathology varies from tendonosis and partial thickness tears, to full thickness tendon tears and in some cases, progression to rotator cuff arthropathy. MRI has been shown to be reliable in the evaluation of tendinopathy [11]. Supraspinatus tendon is the most common site in shoulder for tendinopathy (fig 6a), followed by subscapularis tendon (fig 6b). For tendonosis, recognized MRI features are increased signal intensity and/or swelling and increased tendon thickness [12]. The signal intensity for tendonosis is lower than the intensity of fluid signal which represents tear.

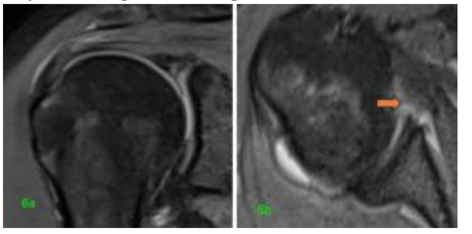

Figure 6 (a) And 6 (b) Showing Supraspinatus And Subscapularis Tendinopathy Respectively.

Complete tear of long head of biceps (fig 7a) was also seen in our study, with resultant restricted arm movement. The torn tendon was seen retracted upto mid arm level. Subscapularis myositis (fig 7b) was seen as Hyperintense signal within the muscle belly. Both of these are relatively uncommon causes of restricted arm motion. MRI is the most suitable method for the evaluation of muscle involvement [13].

One of our patient had septic arthritis with coexistent osteomyelitis. In our study, abnormal diffuse marrow signal was seen with joint effusion, synovial thickening and intramedullary collection (fig 8a and 8b). Reactive marrow edema of septic arthritis may be confused with osteomyelitis, however in true bone infection the marrow edema is extensive and multifocal. [14]

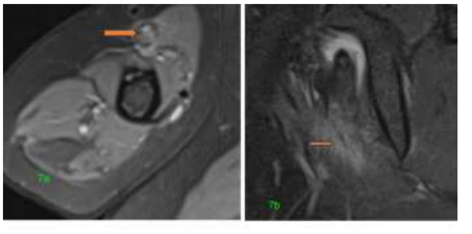

Figure 7 (a) Shows Retracted Torn Long Head Of Biceps, 7 (b) Showing Subscapularis Myositis. Figure 8 (a And B) Showing Septic Arthritis And Changes Of Osteomyelitis.

CONCLUSION

The shoulder is anatomically and functionally complex. MR imaging plays a critical role in the assessment of the shoulder, specifically adding value in assessing the labroligamentous complex, rotator cuff, primary impingement, and entrapment syndromes. Our study analyzed a wide spectrum of pathologies and findings in patients with restricted arm motion.

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