Original Article

MRI in Assessing the Most Common Cause of Shoulder Joint Pain

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Abstract

Background : Shoulder pain and reduced function are common complaints in an old patient and in a young patient following trauma in an Outpatient Department (OPD). The symptoms are often related to the unique anatomic relationships present around the shoulder joint. Impingement of the rotator cuff and adjacent bursa between the humeral head and the coracoacromial arch are among the most common causes of shoulder pain. MRI is an ideal imaging modality for pathologies of the shoulder joint.

Key words : Shoulder Joint Pain, Role of MRI ,Rotator Cuff Injuries.

Shoulder pain and functional limitations are common complaints, especially among older adults and young patients following trauma, often due to the complex anatomical relationships around the glenohumeral joints. Pathologies such as rotator cuff impingement between the humeral head and coracoacromial arch are key contributors to these symptoms. Magnetic Resonance Imaging (MRI) stands out as the ideal modality for evaluating soft tissue injuries of the shoulder, surpassing other imaging techniques in accuracy and detail. This study aims to assess the role of MRI in diagnosing causes of shoulder pain and to identify the most frequently affected anatomical structures in patients presenting with shoulder complaints (Figs 1-9).

Aims and Objectives

To evaluate the role of MRI in imaging soft tissue injuries of shoulder joint.

To ascertain the most common cause of pain in shoulder joint.

Materials and Methods

MRI images depicting soft tissue pathologies of shoulder joint stored in MEDSYNAPSE database in Department of Radiodiagnosis, SIMS&RC, Bangalore were retrospectively reviewed with retrieval of data.

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Editor's Comment :

- MRI is a highly effective tool for detecting soft tissue pathologies in the shoulder, making it the preferred choice for clinicians.
- Supraspinatus tendon injuries are the most prevalent cause of shoulder pain, with isolated and combined tendon pathologies commonly observed.
- Labral injuries and biceps tendinopathy are also frequently noted, especially following trauma, while deltoid involvement is rare.

Results

A total of 65 cases with shoulder pain were evaluated retrospectively from the MEDSYNAPSE data base in the Department of Radio-diagnosis at SIMS&RC, Bangalore.

Majority of the cases showed the most commonly involved structure in case of shoulder pain was supraspinatus tendon. Isolated cases of supraspinatus tendon pathologies were also a common finding. Few of the cases showed pathology in the supraspinatus, infraspinatus tendon and subscapularis following trauma. The involvement of all the rotator cuff muscles and the biceps tendon was noted in a case of severe trauma. Biceps tendinopathy was a common non-specific finding in majority of the cases. Labral injuries

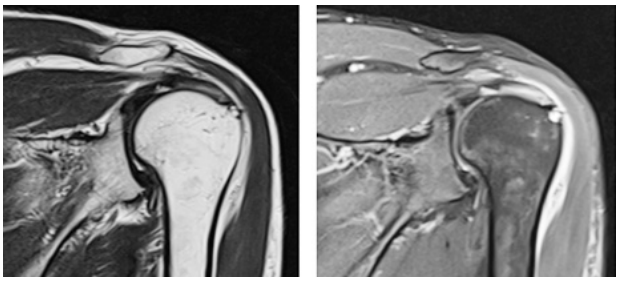

Fig 1 — Coronal T2WI (a) and coronal PDFS (b) showing partial thickness articular surface tear of supraspinatus tendon.

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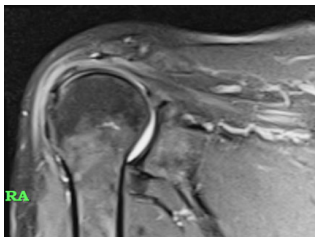


Fig 2 — Coronal PDFS image showing a rim rent tear at the site of insertion of supraspinatus tendon.

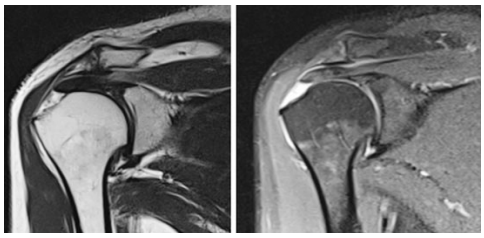


Fig 3 — Coronal T2WI (a) and coronal PDFS (b) showing complete tear of supraspinatus tendon with retraction of fibers and fluid collection along the insertion site.

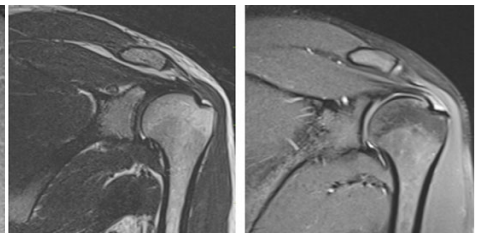


Fig 4 — Coronal T2WI (a) and coronal PDFS (b) showing foot print tear of supraspinatus tendon at the insertion site.

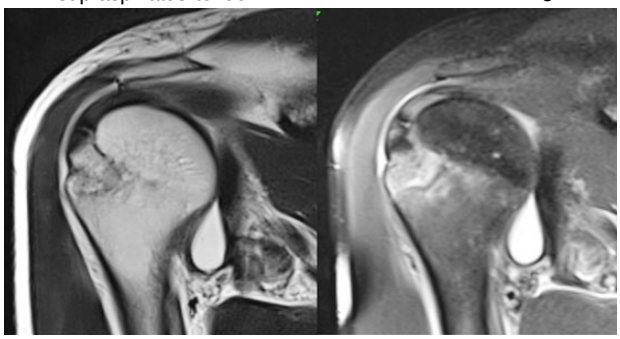


Fig 5 — Coronal T2WI (a) and coronal PDFS (b) showing full thickness tear of the supraspinatus tendon extending from the articular surface to the bursal surface with mild retraction of the tendon and presence of fluid in between the tear. Presence of fluid in the inferior axillary pouch is also noted with mild joint effusion.

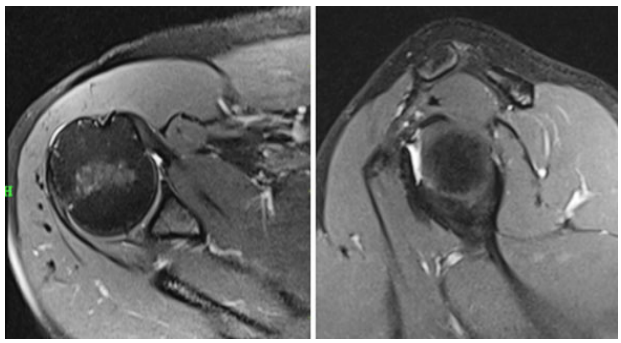
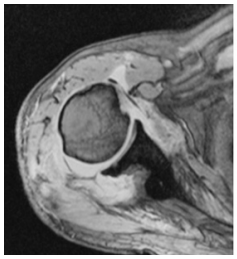


Fig 6 — Case 6: Axial PDFS (a) and sagittal PDFS (b) showing type II SLAP tears.



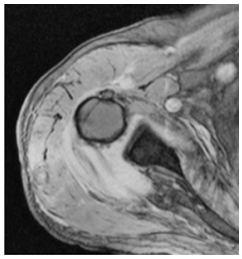
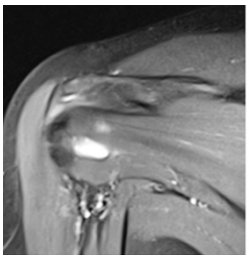


Fig 7 — Axial PDFS (a): biceps tendon is not seen in the proximal aspect of bicipital groove. Axial PDFS (b): further down section images show mildly oedematous biceps tendon with wavy pattern.



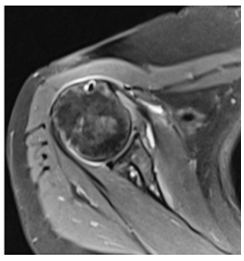


Fig 8 — Coronal PDFS (a) and axial PDFS (b) images showing hyperintense signal along the insertion site of infraspinatus muscle.

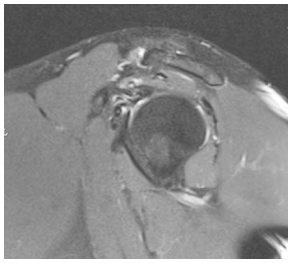


Fig 9 — Sagittal PDFS image (arrow) showing type III acromion impinging on supraspinatus

were a common finding after a traumatic event. Deltoid muscle was rarely involved in any pathology. The involvement of infraspinatus, subscapularis, teres minor, labrum and deltoid were never seen without the involvement of supraspinatus pathology.

Discussion

Pain and reduced mobility of the shoulder is one of the most common complaints following trauma or in old age. These symptoms are often related to the unique anatomical relationships present around the glenohumeral joint.

Anatomical variations in the shape of the acromion, degenerative changes of the rotator cuff tendons with or without calcifying deposits, repetitive mild trauma or severe trauma, chronic overuse due to occupation or sports activities are among the most common causes resulting in pathology of the rotator cuff muscles by increasing the friction against the acromion or the coracoacromial arch resulting impingement of the rotator cuff and adjacent humeral head and coracoacromial arch resulting in pain around the shoulder joint[1].

The rotator cuff muscles are the most commonly involved anatomical structure which are responsible for causing shoulder pain. Ultrasound (USG) and Magnetic Resonance Imaging (MRI) can be used for evaluating the cause of shoulder pain. Shoulder ultrasound has a reasonable amount of accuracy in detecting pathologies of the rotator cuff structure

however the learning curve is relatively longer and the findings are usually subjective hence, MRI is preferred over USG and is considered as the investigation of choice in assessing soft tissue pathologies around the shoulder joint[2]. Shoulder arthrography is considered as the gold standard for assessing the shoulder joint however being an invasive procedure is not done on a regular basis unless and until absolutely required.

Rotator cuff is composed of tendons of the subscapularis, supraspinatus, infraspinatus and teres minor, all of which have a common insertion in the head of the humerus. The main function of rotator cuff is to provide stability to the shoulder joint. Rotator cuff injuries are most commonly encountered pathologies around the shoulder joint.

The various types of acromion are Type I (flat), Type II (curved), Type III (hooked) and Type IV (convex). Type III and IV cause impingement over the rotator cuff structure resulting in pain. Subacromial Impingement Syndrome is a painful compression of the supraspinatus tendon, subacromial-subdeltoid bursa and long head of biceps tendon between the humeral head and anterior portion of the acromion during abduction and forward elevation of the internally rotated arm resulting in pain. There are 3 stages of impingement, Stage I where there is edema and hemorrhage, Stage II in which there is fibrosis and thickening of the tendons and stage III in which there is progressive impairment of function due to degeneration and rupture of tendon.

Other causes of shoulder pain include narrowed subacromial space, os acromiale which occurs due to non-fusion of the ossification centres of the acromion, supraspinatus hypertrophy due to sports activities and acromio-clavicular joint osteoarthritis.

Rotator cuff tears are the most commonly encountered pathologies around the shoulder joint which can occur either due to trauma which is most common in young age or due to degenerative changes resulting in subacromial impingement which is common in old age.

Types of Rotator Cuff Tears are[3] :

(i) Partial thickness tears: include articular surface tears, bursal surface tears and inter-substance tears

(ii) Full thickness tears: include incomplete full thickness tears, complete full thickness tears, complete full thickness tears with retraction, complete full thickness tears with retraction and muscle atrophy. Muscle atrophy is classified as mild, moderate or severe based on the tangent sign.

The tears are best visualised on coronal proton density and T2 weighted imaging sequences.

Tendinosis also known as tendinitis or tendinopathy is the second most common cause of shoulder pain which occur due to degeneration of the of the tendons which appear as thickening of the tendon with myxoid changes and edema which is better visualized on proton density sequences.

Rotator cuff arthropathies are a pattern of joint degeneration which occur due to loss of stabilizing function of the rotator cuff tendons. The imaging findings include reduction of acro-humeral distance, acetabularization of coraco-acromial arch, narrowing of glenohumeral; joint and humeral head necrosis with collapse of humeral head[4].

The most commonly affected structure in decreasing order are supraspinatus, biceps, infraspinatus, subscapularis, teres minor.

Superior labral anterior posterior injuries are usually associated with injuries to the rotator cuff structure and rarely occur in isolation.

Conclusion

The study reinforces the value of MRI in the evaluation of shoulder pain, providing detailed insights into soft tissue injuries that often escape detection by other imaging modalities. Supraspinatus tendon is most commonly implicated, with rotator cuff and labral injuries frequently seen after trauma or in degenerative conditions. These findings highlight the importance of early and accurate MRI-based diagnosis to guide management and improve patient outcomes in shoulder pathology.

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