



“ROLE OF MRI IN EVALUATION OF SHOULDER JOINT PATHOLOGIES”

Radio-Diagnosis

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ABSTRACT

Introduction: Shoulder joint is a ball and socket joint and is one of the most freely movable joints in the body. Shoulder joint pathologies frequently present with shoulder joint pain and MRI shoulder is routinely used in evaluating shoulder joint pathologies due to excellent soft tissue contrast and multiple imaging planes. It is also a non-invasive study. **Methods:** MRI of the shoulder joint was performed on a Siemens 3.0 Tesla Magnetom Skyra MRI machine on 65 patients from DECEMBER 2021 to APRIL 2022 in tertiary care SVP Hospital, NHLMMC, Ahmedabad. No age and gender bias was followed. **Results:** In our study, rotator cuff pathologies were the most commonly encountered abnormality. Out of which, supraspinatus was the most commonly involved tendon. **Conclusion:** Magnetic Resonance Imaging of the shoulder joint is the best imaging modality to evaluate for shoulder pain. Various pathologies can be identified which help in guiding further management for the patient.

KEYWORDS

MRI shoulder, Rotator cuff, Labrum, Tear, Tendinopathy

INTRODUCTION:

The shoulder joint is a ball and socket joint with an extensive range of motion which comes at expense of stability and operational needs. For identifying any pathology of the shoulder joint, we need to understand the complex arrangement of bones, muscles, tendons and ligaments around the shoulder joint. There are various joints and structural features that help in maintaining the integrity of shoulder joint and are damaged during trauma and repeated use.[1]

Shoulder pathologies affect 75% of the population over a lifetime and are a common cause of morbidity in adulthood. It leads to shoulder pain which causes sleep disruption, debilities during daily activities and positional pain. There is absence of any significant traumatic injury in the majority of the patients. The symptoms usually develop gradually and occur due to bony or soft tissue injuries occurring due to frequent use and wear & tear over a period of time.[2]

MRI is very useful in imaging of the soft tissue and bony derangements, which is not seen with conventional imaging modalities like computed tomography(CT) or arthrography. Coronal oblique images of obtained during MRI of the shoulder joint is usually parallel to the course of supraspinatus tendon.[3] Apart from this, the glenoid labrum is seen without injection of contrast material with the help of MRI. Rotator cuff is also seen with MRI and tendons can be seen separately. This helps in accurate localization of the pathology. Subacromial bursa can also be seen with MRI which is not visualized on ultrasonography. Ligaments around the shoulder joint can also be identified precisely.[4]

Aims And Objectives:

- To evaluate patients with painful shoulders and other complaints with MRI.
- To evaluate various patterns of shoulder joint pathologies, particularly rotator cuff abnormalities.

MATERIALS AND METHODS

We conducted a retrospective observational study at department of radiodiagnosis, SVPIMSR by performing a MRI of the shoulder joint on a Siemens 3.0 Tesla Magnetom Skyra MRI machine in 65 patients over a course of 5 months from December 2021 to April 2022. The data was collected from PACS of SVPIMSR.

Inclusion criteria

Patients referred to the radiodiagnosis department of SVPIMSR for shoulder MRI presented with either (1)Shoulder pain (2)Movement Restriction and/or (3)H/O shoulder dislocation.

Patient of all ages and sex were included.

Exclusion criteria

- Patients having no abnormalities on shoulder MRI.
- Patients with previous operative history of shoulder joint.
- Patients with known history of malignancy.
- Patients who had contraindications for MRI like pacemaker, metallic implants or claustrophobic patients.

Imaging Techniques

All patients underwent MRI of the shoulder joint using a dedicated shoulder coil (16 channels). An axial localizer was used in to determine the anatomic area of acromioclavicular joint through glenohumeral joint. The following were the detailed parameters of each sequence:

Sequence	TR(ms)	TE(ms)	No. of slices	ST(mm)	FOV(mm)
PD FS axial	2600	23	24	3	120
PD FS coronal oblique	2400	11	20	3	120
PD FS sagittal	2600	23	25	3	120
T1 TSE sagittal	440	11	25	3	120
T2 TSE axial	5220	74	25	3	159
T2 TSE coronal	5220	74	25	3	159

Observations and Results

The various pathologies as seen in our study are as follows:

Pathology	Frequency
Rotator cuff pathologies	52
Arthropathy	43
Labral pathologies	12
Bursitis	12
Rotator interval tear	8
Adhesive capsulitis	7
Biceps tendon pathologies	14
Avascular necrosis	1
Calcific tendinitis	1
Hemophilic arthropathy	1

The most commonly observed abnormality was rotator cuff pathology followed by arthropathy caused by the degenerative changes in the articular surfaces of the joint.

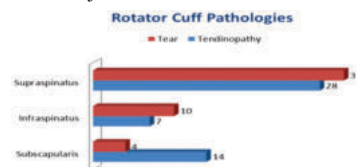


Figure 1

Among rotator cuff muscles, supraspinatus was the most frequently affected muscle. The most common pathology encountered within it was tear as shown in figure 1.

Distribution among supraspinatus tears into full-thickness/partial thickness and complete/incomplete is shown in figure 2:

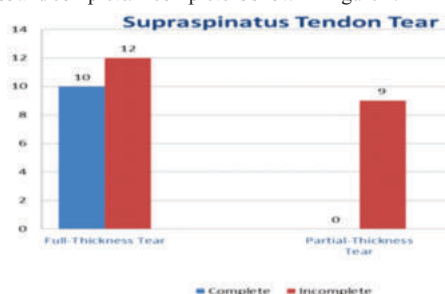


Figure 2

Among pathologies involving labrum; its distribution is shown in table:

Pathologies	Frequency
Bankart's lesion	2
Perthe's lesion	1
ALPSA	1
Hill Sach's defect	4
SLAP Tear	5
Degenerative Labral Signal	3

Among osteoarthritic changes, acromioclavicular joint arthropathy(6) was more prevalent than glenohumeral arthropathy(37).



Figure 3- supraspinatus tendinopathy and tears

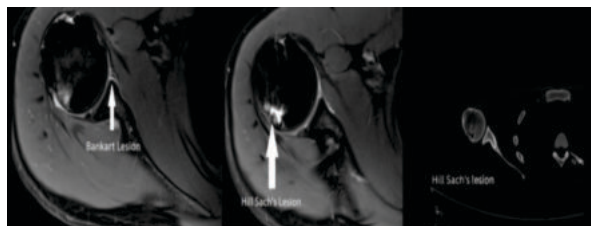


Figure-4 Recurrent Shoulder Dislocations

DISCUSSION

Atraumatic shoulder pain is a common ailment in adulthood. It has been shown that the pain is triggered by abnormalities in the rotator cuff and acromioclavicular joint. Other less frequent causes include biceps tendon injury and glenohumeral joint pathologies.[1]

MRI shows excellent bone marrow features and is valuable option for imaging the musculoskeletal system. Due to varied signal intensities, soft tissues like fat, muscle, fibrous tissues and cartilage are easily differentiated.[5]

In our study it was found that shoulder pathologies were more commonly encountered in males(58%) as compared to females(42%) which was in accordance with study done by Chaudhary P.(2017).[6]

The most frequently encountered pathologies were that of rotator cuff followed by arthropathies, labral pathologies, bursitis, rotator interval tear, adhesive capsulitis, biceps tendon pathologies and some rare entities like avascular necrosis, calcific tendinitis and hemophilic arthropathy. MRI is useful in differentiating rotator cuff tendinopathies and tears. It also helps to differentiate full-thickness tears from partial thickness tears. Full-thickness tear is seen as T2WI/PD hyperintensity along the entire width of tendon from articular surface to subacromial-

subdeltoid bursa. Partial thickness tear can be either articular, bursal or intrinsic. Intrinsic tear cannot be seen on arthroscopy but is responsible for patient's symptoms. Tendinopathy also shows increased signal on T2WI/PD images but it is not as bright as seen in tear as it is due to degenerative changes. In tear fluid accumulates to fill the gap between torn fibers of tendon.[7] MR imaging can provide comprehensive data about rotator cuff pathologies like tear thickness, shape and tendon retraction, tear extension to adjacent structures and fatty atrophy of muscle that have effects on the status of rotator cuff and also on subsequent management can be assessed with MRI. Also the data regarding coracoacromial arch and impingement can be acquired using MRI.[8] In our study, it was observed that the supraspinatus tendon was the most commonly involved rotator cuff tendon. Supraspinatus tear was most commonly seen and among the tear, full thickness tear was most frequently encountered.

It was also observed that arthritic changes could be the cause of a patient's symptoms. It was more prevalent in acromioclavicular joint(57%) as compared with glenohumeral joint(9%) in our study. There are a number of reports showing that MR arthrography is better than conventional MRI for labral lesions however meta-analysis of such studies show that MR arthrography is only slightly better to conventional MRI in visualizing labral pathologies.[9] In our study 4 patients had recurrent anterior shoulder dislocations. Out of these, 2 had Bankart's lesion and 1 each had ALPSA and Perthe's lesion in glenoid labrum. All 4 were found to have Hill Sach's defect in posterolateral aspect of head of humerus.

With close examination of oblique sagittal images on MRI, subcoracoid bursa and the subscapularis recess can be differentiated.[10] Bursitis is seen as a collection of fluid in the bursae. In our study, it was observed in 12 patients(24%). Adhesive capsulitis causes pain and significantly reduced joint motion ("frozen shoulder"). It usually results from thickening and spasm of the joint capsule and synovium. It can be diagnosed on MRI by observing a thickening of synovium and capsule of >4 mm.[11] In our study out of all the patients adhesive capsulitis was observed in 7 patients (14%).

Biceps tendon pathologies also causes shoulder pain. It was observed in 14 patients (28%). These pathologies ranged from tendinopathy to tears and were evaluated on MRI.

CONCLUSION:

Magnetic Resonance Imaging of the shoulder joint is the best imaging modality to evaluate for shoulder pain. It is highly accurate in evaluation of soft tissues like tendons, ligaments, labrum and muscles. This helps in guiding further management of the patient

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