

# Shoulder Pathology Diagnosis: A Study of MRI-Arthroscopy Agreement

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**Abstract:** *Shoulder pain affects quality of life and productivity. This study evaluates MRI and arthroscopy in diagnosing shoulder joint pathologies. MRI offers multiplanar imaging and high resolution, while arthroscopy provides accurate identification of rotator cuff injuries and labroligamentous structures. Combining MRI and arthroscopy enhances diagnostic accuracy and treatment outcomes.*

**Keywords:** shoulder pain, MRI, arthroscopy, diagnostic accuracy

## 1. Introduction

Shoulder pain is a common presenting complaint in orthopedic and primary care settings, with significant implications for quality of life, productivity, and overall well-being<sup>1,6</sup>. Accurate diagnosis and effective treatment are crucial to preventing long-term damage and promoting optimal outcomes<sup>2,5</sup>. This review examines the current state of diagnostic imaging and interventional techniques for shoulder joint pathologies, highlighting the synergy between MRI and arthroscopy<sup>1,2,3,4</sup>.

## 2. Aims and Objectives

### 2.1. Aims

To compare the efficacy of MRI in evaluation of shoulder joint pathology in comparison to arthroscopy.

### 2.2. Objectives

- To compare the efficacy of MRI in evaluation of rotator cuff tear.
- To compare the efficacy of MRI in evaluation of shoulder instability.

## 3. Methods and Materials

This comparative study was conducted in the Department of Radiodiagnosis at Justice K S Hegde Hospital, Deralakatte on patients who were referred for MRI for evaluation of shoulder joint pathology and subsequently underwent Arthroscopy. The patients were evaluated with 1.5 Tesla MRI using standard protocol.

Sample size: 20

Type of study: retrospective study

Duration of study: 2 years

### 3.1. Inclusion Criteria

Patients who have undergone MRI for shoulder joint pathologies and subsequently underwent Arthroscopy

### 3.2. Exclusion Criteria

People who have undergone previous arthroscopy/open shoulder joint surgery.

### 3.3. MRI Protocol

Proton density fat suppressed images in coronal, axial and sagittal planes.

Proton density images in coronal plane.

T2 weighted images in axial, sagittal planes.

T1 weighted images in coronal planes.

## 4. Results

Data of 20 patients were analyzed in the study.

### 4.1. Age and Sex Distribution

Of the 20 patients, 16(80%) were males and 4(20%) were females. The age group ranged from 22 to 62 years.

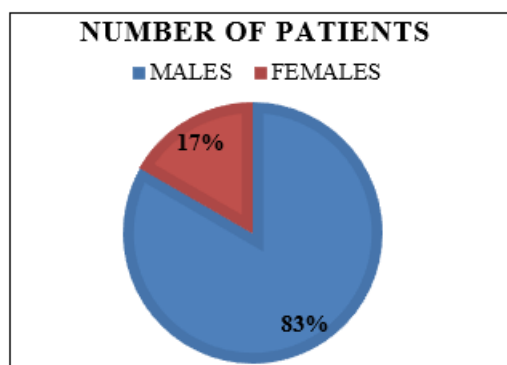


Figure 1

### 4.2. Distribution of Different Kinds of Shoulder Pathologies

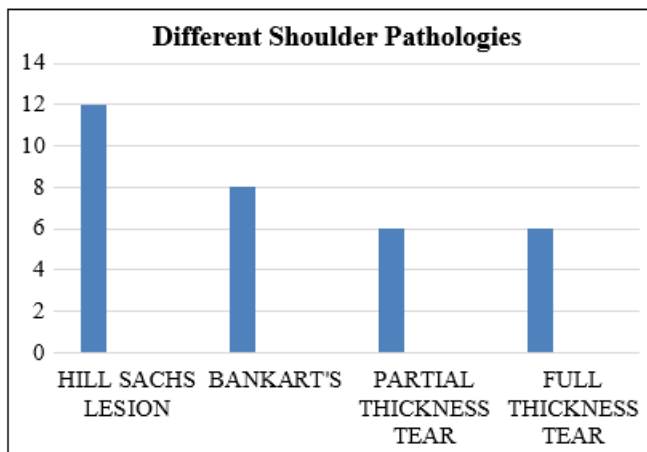


Figure 2

The most common pathologies detected on MRI were Hill Sach's lesion (60%), followed by Bankart's lesion (45%), partial thickness tear of rotator cuff (30%) and full thickness tear of rotator cuff (30%).

#### 4.3. Analysis

- MRI had a sensitivity of 100% for detecting Hill Sachs lesion and specificity of 75%
- Sensitivity of 88% for detecting Bankart's lesion and specificity of 100%.
- MRI had a sensitivity of 100% for detecting Partial thickness rotator cuff tear and specificity of 76%.
- Sensitivity of 100% for detecting Full thickness rotator cuff tear and specificity of 100%.

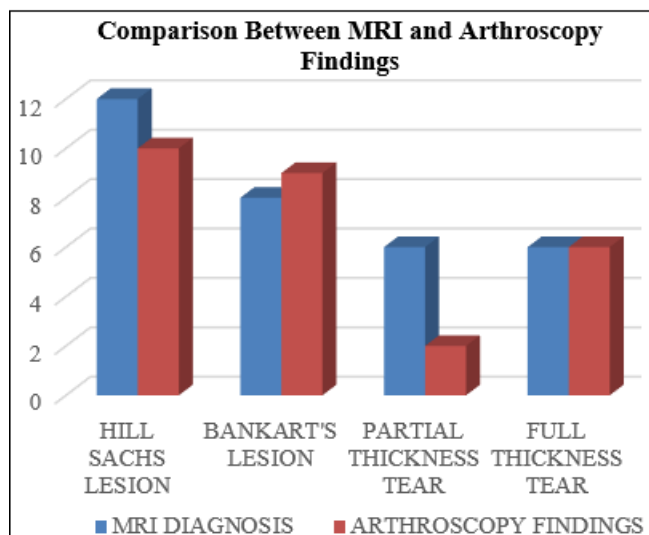


Figure 3

## 5. Discussion

One of the most prevalent musculoskeletal concerns is shoulder discomfort. The quality of life, everyday activities, and job productivity are all impacted by shoulder discomfort. It is the third most frequent reason for musculoskeletal consultations, with a yearly incidence of 14.7 per 1000 patients and a lifetime prevalence of up to 70%, according to studies<sup>6</sup>.

Due to its multiplanar imaging, high resolution, and absence of ionizing radiation, magnetic resonance imaging (MRI) is an essential diagnostic tool in shoulder joint pathologies.<sup>1,2,3,5</sup>

Arthroscopy is a more accurate method for identifying further rotator cuff injuries as well as labro-ligamentous structures, joint capsules, cartilage and also for therapeutic purposes.<sup>1,2,3,4</sup>

### 5.1 Rotator Cuff Tears

Rotator cuff plays an important role in the stabilization of shoulder joint during the movements of arm.<sup>1,2</sup>

Rotator cuff pathologies are the most common cause of shoulder joint pain and cause loss of stability and strength.

The rotator cuff contains the tendons of subscapularis, supraspinatus, infraspinatus and teres minor.<sup>3,5</sup>

The main function of rotator cuff is to stabilize and center the humeral head in the glenoid cavity during the movements of arm by compressing the humeral head against the glenoid.<sup>1,2</sup>

The rotator cuff also plays an important role in external and internal rotation of the arm.

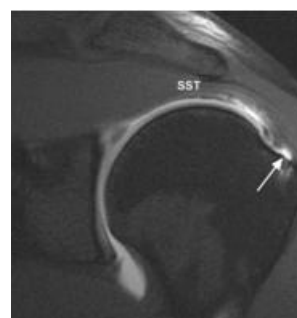
The sensitivity and specificity of diagnosing rotator cuff tears in this study was comparable to other studies with the exception of Muthami KM et al<sup>4</sup>, that showed sensitivity of 0.46.

Our study also assessed the sensitivity and specificity separately for partial and complete thickness tears.

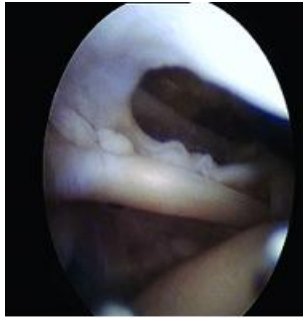
MRI had a sensitivity of 100% for detecting Partial thickness rotator cuff tear and specificity of 76%, sensitivity of 100% for detecting Full thickness rotator cuff tear and specificity of 100%.

Out of the 6 partial thickness tears diagnosed on MRI, 2 were diagnosed to be full thickness tears on arthroscopy and 2 tears were wrongly attributed by MRI and were not found on arthroscopy.

However, of the 6 full thickness tears all were rightly diagnosed and found on arthroscopy.



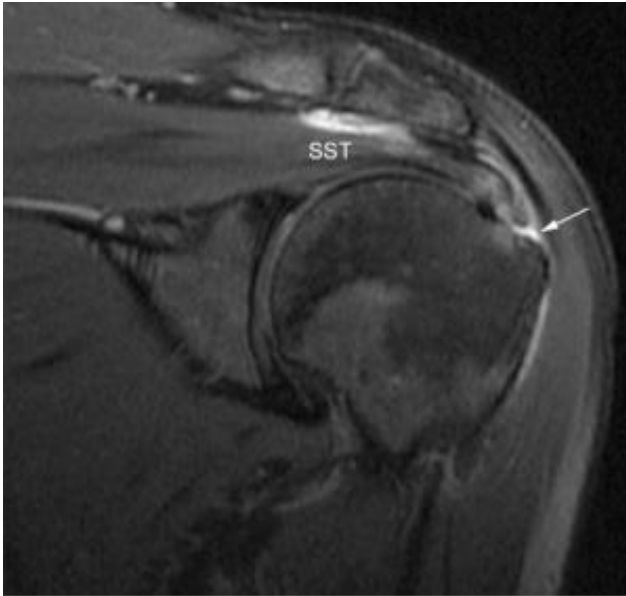
**Figure 4:** Coronal oblique fat-saturated T1-weighted MR image shows an articular-surface partial-thickness tear in the distal supraspinatus tendon



**Figure 5:** Arthroscopy image showing partial thickness tear



**Figure 8:** Arthroscopy image showing Bankart tear



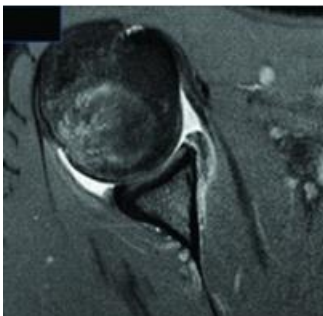
**Figure 6:** Coronal oblique fat-saturated T2-weighted MR image shows a bursal-surface partial-thickness tear in the distal supraspinatus tendon.

## 5.2 Bankart Lesion

Bankart lesion is an injury of the anterior glenoid labrum due to anterior shoulder dislocation.<sup>1,2,3</sup>

Detachment of the anteroinferior labrum (3-6 o'clock) with complete tearing of the anterior scapular periosteum with or without an osseous fragment of the glenoid.<sup>1,2</sup>

If the bone of the anteroinferior glenoid rim detaches along with the labrum, the lesion is then termed a bony or osseous Bankart lesion.<sup>1,2,4</sup>



**Figure 7:** MRI axial image showing Bankart lesion.

In this study we found MRI to be highly sensitive and specific in detecting Bankart tear.

In our study MRI was found to be more specific than sensitive in detecting Bankart tear.

There were no false positive results but 1 Bankart's tear was missed on MRI and diagnosed on Arthroscopy.

Our study showed results similar to study conducted by Abhinav Bhatnagar et al.<sup>1</sup>, UP joshi et al., and Iannotti JP et al.

Comparatively low sensitivity of MRI on detecting Bankart lesion was attributed by Joshua M Polster to:

- Wide variation in the type and position of Bankart lesion.
- Close proximity and abutment of labrum to capsule and cortical bone which have same signal intensity makes it difficult to distinguish them from one another.

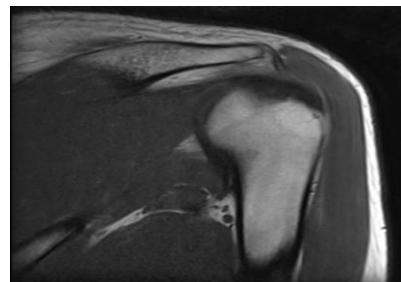
## 5.3 Hill Sachs Lesion

A Hill-Sachs lesion is a bony defect of the humeral head that is often linked with recurrent anterior shoulder instability.<sup>1,2</sup>

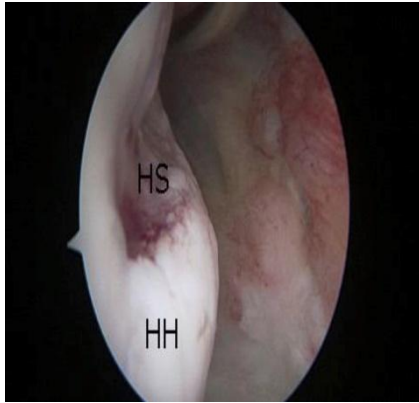
Hill-Sachs lesion typically occurs with an anteroinferior glenohumeral dislocation event.<sup>3,4</sup>

The dislocation event pushes the humeral head anteriorly into contact with the dense anterior glenoid causing a compression fracture along the posterosuperolateral aspect of the humeral head.<sup>3,4</sup>

Out of 12 cases diagnosed on MRI, 2 were wrongly attributed on MRI and not found on arthroscopy.



Sagittal T2 weighted MRI image showing Hill Sachs's lesion



Arthroscopic image showing Hill Sach's lesion

## 6. Conclusion

MRI has a high sensitivity and specificity regarding the diagnosis of rotator cuff tears and shoulder joint instability.<sup>1,2,3</sup>

MRI and Arthroscopy have complimentary roles in diagnosis of shoulder joint pathologies.<sup>4,5,6</sup>

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