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Original Research Article

Role of MRI in Diagnosis of Rotator Cuff Tear: An Experience of Tertiary Care Hospital Bikaner Rajasthan

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Abstract:

The prevalent cause of shoulder pain is rotator cuff tears (RCT), which induce profound discomfort and morbidity. Hence, their detection and appropriate management become important to alleviate morbidity and enhance quality of life. Imaging has an important role in the diagnosis of such patients to guide for further management. The aim of the study is to compare the efficacy of MRI in diagnosing shoulder pathologies in comparison to arthroscopy, considering arthroscopy as the gold standard. 30 Patient with suspected rotator cuff injury patients were included in the study. MRI of the shoulder joint was done followed by shoulder arthroscopy. The accuracy of MRI in diagnosis of rotator cuff partial tears, was 90%, while sensitivity and specificity was 100.00%, 78.57% and positive predictive value was 84.21% and negative predictive value was 100.00% and accuracy of MRI in diagnosis of rotator cuff full tears, was 86.67%, while sensitivity and specificity was 63.64%, 100.00%) and positive predictive value was 100.00% and negative predictive value was 82.61% in our study. Our study demonstrates a high sensitivity and specificity for the MRI diagnosis of both partial and full thickness rotator cuff tears and good correlation with arthroscopic findings.

Keywords: Rotator cuff, Shoulder pain, Arthroscopy, MRI.

Introduction

The shoulder joint, a ball and socket joint with no defined axis of movement, offers an extensive spectrum of multiplanar rotation. Because of this range of motion, mobility is reduced. The rotator cuff compensates for the weak bony structure by shielding the shoulder anteriorly, posteriorly, and superiorly with its capsule and tendons. [1-2] Shoulder pain is the third most prevalent reason of pain in the musculoskeletal system following low back pain and knee pain, resulting in significant health consequences and a lower quality of life. [3] Rotator cuff tears (RCT) are frequent among individuals with shoulder pain, accounting for up to 86% of episodes. Hence, their detection and appropriate management become important to reduce morbidity and improve quality of life. Imaging is important in the diagnostic workup of such patients to guide for further treatment. An array of radiological approaches has been applied for the detection of RCT. Each of these modalities presents its own set of limitations and advantages. Plain radiography, computed tomography, contrast arthrography, ultrasonography, and magnetic resonance imaging (MRI) are different types of imaging that can be employed for assessing shoulder disorders. [4] Arthrography detects full-thickness (FT) tears with high accuracy, although it is an intrusive treatment with a potential degree of risk and pain. Furthermore, arthrography is not sensitive

to partial-thickness (PT) tears affecting the superficial surface of the cuff. [5]

MRI has revolutionized the diagnosis of shoulder pathologies. MRI is a proved sensitive, accurate, cost-effective and a non-invasive tool in investigating shoulder pathology. [6]

MRI also provides information on areas not seen in arthroscopy, like the internal structure of the rotator cuff.

Rotator cuff tears are one of the most common causes of shoulder pain for which patients seek treatment. As in our daily work, the shoulder joint is the most frequently used, there is higher chance of having shoulder joint injury. 30-70% of patients having shoulder pain are due to abnormality of rotator cuff.[7]

Thus, MRI before diagnostic and therapeutic arthroscopy may be useful in planning suitable management of shoulder pain.

Materials and Method

Study Type: Analytical type of observational study.

Inclusion Criteria

- Patients with clinically suspected rotator cuff tear of shoulder.
- Patients willing to give Informed and written consent for arthroscopy and MRI.

Exclusion Criteria

- Patients with rotator cuff tear unfit to undergo MRI like metallic aneurysms clips, pacemakers, metallic vascular clamp placement, history of claustrophobia or any other contraindication to MRI.
- Patients with Shoulder joint fracture in X-ray on affected side.
- Patients with Previous history of recurrent shoulder dislocation on affected side.
- Patients with Previous history of surgery on affected shoulder.

Methodology

- After approval from institutional ethical committee,patient was selected for study (study population) after applying inclusion and exclusion criteria.
- Prior to examination, written and informed consent was taken from the patient/guardian (in case of minor)
- Patient was selected after applying inclusion and exclusion criteria.
- Prior to MRI, proper precautions will be taken and patient was excluded from study if MRI is contraindicated due to any reason.

Results

Table 1: MRI finding

MRI Finding	No of patients	Percentage
No tear	4	13.33
Full thickness tear	7	23.33
Partial thickness tear	19	63.33
Total	30	100.00

In our study MRI diagnosed 7 (23.33%) patients with full thickness tear and 19 (63.33%) patients with full thickness tear.

Table 2: Arthroscopy finding

Arthroscopy finding	No of patients	Percentage
No tear	3	10.00
Full thickness tear	11	36.67
Partial thickness tear	16	53.33
Total	30	100.00

In our study arthroscopy was diagnosed 11(36.67%) patients with full thickness tear and 16 (53.33%) patients with full thickness tear.

Table 3: The diagnostic parameters of MRI for the diagnosis of partial-thickness tears (PTT)

Sensitivity	100.00%
Specificity	78.57%
Positive predictive value	84.21%
Negative predictive value	100.00%
Diagnostic accuracy	90.00%

The accuracy of MRI in diagnosis of rotator cuff partial tears, was 90%, while sensitivity and specificity were 100.00%, 78.57%) and positive predictive value was 84.21% and negative predictive value was 100.00%

Table 4: The diagnostic parameters of MRI for the diagnosis of Full-thickness tears (FTT)

Sensitivity	63.64%
Specificity	100.00%
Positive predictive value	100.00%
Negative predictive value	82.61%
Diagnostic accuracy	86.67%

The accuracy of MRI in diagnosis of rotator cuff full tears, was 86.67%, while sensitivity and specificity were 63.64%, 100.00%) and positive predictive value was 100.00% and negative predictive value was 82.61%.

Discussion

A rotator cuff tear is a tear of one or more of the tendons of the four rotator cuff muscles of the shoulder. A rotator cuff 'injury' can include any type of irritation or overuse of those muscles or tendons, and is among the most common conditions affecting the shoulder [8].

The tendons of the rotator cuff, not the muscles, are most commonly involved, and of the four, the supraspinatus is most frequently affected, as it passes below the acromion. The role of the supraspinatus is to resist downward motion. The supraspinatus resists downward motion while the shoulder is relaxed as well as when carrying weight. Such a tear usually occurs at its point of insertion onto the humeral head at the greater tubercle. Even though the supraspinatus is the most commonly injured muscle of the four muscles in the rotator cuff, the other three muscles that comprise the rotator cuff, the infraspinatus, teres minor, and subscapularis, may also be injured [9].

Magnetic resonance imaging (MRI) and ultrasound are comparable in efficacy and helpful in diagnosis although both have a false positive rate of 15 - 20%. MRI can reliably detect most full-thickness tears although very small pinpoint tears may be missed. In such situations, an MRI combined with an injection of contrast material, a MR-arthrogram, may help to confirm the diagnosis. It should be realized that a normal MRI cannot fully rule out a small tear (a false negative) while partial-thickness tears are not as reliably detected [10]

In the present study supraspinatus tendon are more prevalent either as a sole finding or in combination with other tendons like infraspinatus. Supraspinatus tendon affection was found in 60.00% of cases followed by Subscapularis tendon affection was found in 10.00% of acses.

Sharma G et al [11] was found that supraspinatus tendon is more prevalent either as a sole finding or in combination with other tendons like infraspinatus. Supraspinatus tendon affection was found in 55% of cases. There was no statistically significant difference in the distribution of pathologies.

Hind Abdulelah Abdulsahib Altahhan et al [12] observed that the most commonly involved tendon was supraspinatus tendon which was involved in all 45 patients (100%), followed by infraspinatus tendon involvement in 11 (24.4%) patients, subscapularis tendon involvement in nine (20%) patients.

The accuracy of MRI in diagnosis of rotator cuff partial tears, was 90%, while sensitivity and specificity were 100.00%, 78.57% and positive predictive value was 84.21% and negative predictive value was 100.00% and accuracy of MRI in diagnosis of rotator cuff full tears, was 86.67%, while sensitivity and specificity was 63.64%, 100.00%) and positive predictive value was 100.00% and negative predictive value was 82.61% in our study.

Our results are consistent with literature, with most studies reporting sensitivities and specificities ranging from 85% to 100% for the MRI diagnosis of rotator cuff tears [13].

Conclusion

Our study demonstrates a high sensitivity and specificity for the MRI diagnosis of both partial and full thickness rotator cuff tears and good correlation with arthroscopic findings.

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