

Determine the Diagnostic Accuracy of MRI for Diagnosis of Rotator Cuff Tear in Patients Presented with Shoulder Pain

MRI for
Diagnosis of
Rotator Cuff
Tear with
Shoulder Pain

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ABSTRACT

Objective: The main objective of the study is to determine the diagnostic accuracy of MRI for diagnosis of rotator cuff tear in patients presented with shoulder pain.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the conducted in the department of radiology, Mayo Hospital Lahore for 6 months i.e. Feb 2019 to Feb 2020.

Materials and Methods: At that point patients were go through MRI. Multi-planar MR imaging of the shoulder was performed utilizing coronal slanted proton thickness, coronal sideways T1 weighted, coronal diagonal T2 weighted with fat immersion, sagittal angled T2-weighted with fat immersion, and hub T2 weighted arrangements.

Results: The mean age of the patients was 50.01±11.28. There were 62(41.3%) males and 88 (58.7%) females in our study. The mean tear size was 3.15±1.42 cm. Sensitivity and specificity of MRI for the diagnosis of 3 rotator cuff injuries was 90.67% and 96.00%. However, PPV and NPV values for MRI was 95.77% and 91.14% respectively. Overall diagnostic accuracy of MRI for the diagnosis of rotator cuff tear in patients presenting with shoulder pain.

Conclusion: Results of this study showed that diagnostic ability of MRI is excellent in diagnosing rotator cuff tear in patients presented with shoulder pain.

Key Words: Diagnostic Accuracy, MRI, Shoulder Pain

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INTRODUCTION

Shoulder torment is a typical protest by patients during doctor visits, and it very well may be because of an assortment of causes. The significant reason for shoulder torment in patients more seasoned than 40 years is rotator sleeve impingement and tears.^{1,2} Rotator sleeve pathology is a typical wellspring of shoulder pain.³ Reported pervasiveness of rotator sleeve tear shift from 6% to 34%, and increment with age.⁴ Ultrasound (US) and attractive reverberation imaging (MRI) are two of the most broadly utilized imaging instruments to explore such side effects. Notwithstanding equivalent indicative precision, restrictions of every methodology exist.³

With the advancement of new arthroscopic methods for treating rotator sleeve problems, MRI has assumed an inexorably significant part as a noninvasive test for figuring out which patients may profit by surgery.⁴⁻⁷ An investigation revealed the affectability and particularity of MRI were 91.7% and 84.2% separately. The determined PPV, NPV were 91.7% and 84.2% separately. The general demonstrative exactness of MRI was 89.1% accepting careful discoveries as gold standard.⁸ Reasoning of this examination is to decide the symptomatic precision of attractive reverberation imaging for analysis of rotator sleeve tear in patients gave shoulder torment accepting careful discoveries as gold standard.⁹ Literature has revealed that MRI has positive function in location of rotator sleeve tear and can be utilized for definite conclusion. In schedule, radiologists don't utilize MRI for identification of rotator sleeve tear, rather patients go for a medical procedure, think that MRI may have some side effects.¹⁰⁻¹²

Medical procedure itself has a few dangers. Neighborhood extents likewise need. So to keep patients from unnecessary medical procedures, we need to lead this examination to build up a system to analyze patients on MRI rather than medical procedure and nearby sizes will likewise be achieved. So that negative patients can be kept from a medical procedure and

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positive patients can be overseen in like manner. This will reduce burden of hospital and patients.¹³

MATERIALS AND METHODS

This cross sectional study was conducted in the department of radiology, Mayo Hospital Lahore for 6 months i.e. 12 Feb 2019 to 11 Feb 2020. The data was collected through non-probability consecutive sampling technique. Sample size of 150 cases is calculated with 95% Confidence level, 7% margin of error for sensitivity and 7% margin of error for specificity of MRI.

Inclusion criteria

- Age 30-70 years of both genders with shoulder pain of moderate to severe intensity (VAS scale >5) indicative of rotator cuff tear.

Exclusion criteria

- Patients having contraindications for surgery e.g.: hemodynamically unstable, cardiac failure or INR > 2.
- Having co-morbid conditions as DM (BSR > 186mg/dl), cerebrovascular accident (clinical examination), deranged LFT (AST > 40IU, ALT > 40IU), deranged RFT (serum creatinine > 1.5mg/dl).
- Patients with h/o shoulder accident or previous surgery, or osteoarthritis

Data Collection: 150 patients fulfilling the selection criteria were recruited for the study from Department of Radiology, Mayo Hospital Lahore. After taking informed consent, demographic information like name, age, sex and contact was obtained. At that point patients were go through MRI. Multi-planar MR imaging of the shoulder was performed utilizing coronal slanted proton thickness, coronal sideways T1 weighted, coronal diagonal T2 weighted with fat immersion, sagittal angled T2-weighted with fat immersion, and hub T2 weighted arrangements. All MRIs was performed by scientist himself under management of an expert Radiologist. Patients were named as certain or negative based on MRI discoveries. At that point patient's gone through a medical procedure under broad sedation and medical procedure results was utilized to affirm the discoveries of MRI. All the data was noted on an organized proforma.

Data Analysis: The data was entered and analyzed in SPSS version 17.0. Quantitative variables like age was measured in the form of mean ± SD. Qualitative variables like gender, full or partial thickness on MRI and surgery was measured in the form of frequency and percentages.

RESULTS

The mean age of the patients was 50.01±11.28 years. Minimum age was 30 years and maximum age was 70 years. There were 62(41.3%) males and 88 (58.7%)

females. There were 81 (54%) patients in which right shoulder was involved and in 69(46%) left shoulder was involved. According to MRI findings in 71% patients there was full thickness and in 79 (52.7%) patients there was partial or no thickness. According to surgical findings there were 75 (50%) patients with full thickness and 75 (50%) with partial or no thickness. The mean tear size was 3.15±1.42 cm. The minimum tear size was 1 cm and maximum was 5 cm.

Table No.1: Descriptive Statistics for Tear Size

n	150
Mean	3.15
Std. Deviation	1.425
Minimum	1
Maximum	5

MRI correctly picked 68 cases with full thickness and correctly identified 72 patients with partial/no thickness. So the sensitivity and specificity of MRI was 90.67% and 96.00%, PPV and NPV were 95.77% and 91.14% respectively.

Table No.2: Diagnostic Accuracy of Rotator Cuff Tears Taking Surgical Findings as Gold Standard

MRI	Surgery		Total	p-value
	Full thickness	Partial / No Thickness		
Full thickness	68(90.67%)	3(4%)	71	0.000
Partial/ No thickness	7(9.33%)	72(96%)	79	
Total	75	75	150	

Sensitivity= 90.67% Specificity= 96.00%
 PPV= 95.77% NPV= 91.14%
 Diagnostic Accuracy= 93.33%

Table No.3: Diagnostic accuracy of rotator cuff tears taking surgical findings as gold standard stratified for age

Age	MRI	Surgery		Total	p-value
		Full thick-ness	Partial / No Thickness		
≤50 yrs	Full thickness	27	1	28	0.000
	Partial/No-thickness	2	46	48	
	Total	29	47	76	
>50 yrs	Full thickness	41	2	43	0.000
	Partial/No thickness	5	26	31	
	Total	46	28	74	

Data was stratified for age of patients. In patients of age ≤ 50 years, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 93.1%, 97.9%, 96.4%, 95.8% and 96.1%. In patients of age > 50 years, the

sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 89.1%, 92.9%, 95.3%, 83.9% and 90.5%. Data was stratified for gender of patients. In males, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 85.7%, 97.1%, 96.0%, 89.2% and 91.9%. In females, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 93.6%, 95.1%, 95.7%, 92.9% and 94.3%. Data was stratified for anatomical side of shoulder. In left side, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 85.4%, 97.5%, 97.2%, 86.7% and 91.4%. Data was stratified for duration of symptoms. In duration<6months, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 84.2%, 94.7%, 94.1%, 85.7% and 89.5%. In patients of duration≥6months, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI were 97.3%, 97.3%, 97.3%, 97.3% and 97.3%.

Table No.4: Diagnostic accuracy of rotator cuff tears taking surgical findings as gold standard stratified for duration of symptoms

Duration	MRI	Surgery		Total	p-value
		Full Thick-ness	Partial / No Thickness		
<6 months	Full thickness	32	2	34	0.000
	Partial/No thickness	6	36	42	
	Total	38	38	76	
≥6 months	Full thickness	36	1	37	0.000
	Partial/No thickness	1	36	37	
	Total	37	37	74	

DISCUSSION

Shoulder pathology is normal and related with significant utilitarian impediments that expansion with age.16 Disorders of the rotator sleeve (RC) ligaments establish the most well-known gathering of pathologies of the shoulder. RC messes are of multifactorial source and may bring about a reformist degeneration of the RC tendons.17 Knowledge of the honesty of the RC ligaments in a scene of subacromial torment is a significant factor to consider in treatment dynamic (careful versus moderate administration), and clinicians utilize an assortment of analytic tests to identify RC messes and to characterize the degree of damage.18

Following clinical assessment, a wide range of radiological investigations have been prescribed to aid diagnosis.19 These have filled in prominence in the course of recent years, especially given the trouble in recognizing the specific reason for shoulder torment,

halfway as a result of the cover of indications from various etiologies. Radiological investigations have included plain X-beam, regular X-beam arthrography, ultrasound and attractive reverberation imaging (MRI).20 The last has picked up favor, being referred to as a valuable radiological appraisal with its high delicate tissue picture goal and having the option to separate among tendinopathy and halfway and full thickness rotator sleeve tears.21 Using this data, the best administration methodology can be detailed to advance the early return of shoulder work for this patient gathering.22

In this MRI findings showed that 71(47%) patients had full thickness and 79(53%) patients were diagnosed with partial/no thickness. However surgical findings of patients showed that there were 75(50%) patients who had full thickness and 75(50%) had partial/no thickness. When diagnostic results of surgical findings and MRI findings were compared it was observed that MRI misdiagnosed 7(9.33%) patients with as partial /no thickness however on surgical findings those patients had full thickness and similarly.23

On the other hand, MRI misdiagnosed 3(4%) patients as full thickness however these patients surgical findings showed that these patients had partial/no thickness. Sensitivity and specificity of MRI for the diagnosis of rotator cuff injuries was 90.67% and 96.00%.24-25 However PPV and NPV values for MRI was 95.77% and 91.14% respectively. Overall diagnostic accuracy of MRI for the diagnosis of rotator cuff tear in patients presenting with shoulder pain.

CONCLUSION

It is concluded that diagnostic ability of MRI is excellent in diagnosing rotator cuff tear in patients presented with shoulder pain. Since full thickness tear establishes a vital thought for surgical repair, this is a significant trademark while choosing an imaging methodology for RC issue.

Author’s Contribution:

Concept & Design of Study: Muhammad Rizwan Asghar
 Drafting: Aisha Asghar, Adeel Qamar
 Data Analysis: Hafiza Sobia Ramzan
 Revisiting Critically: Muhammad Rizwan Asghar, Aisha Asghar
 Final Approval of version: Muhammad Rizwan Asghar

Conflict of Interest: The study has no conflict of interest to declare by any author.

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