Section: Radiodiagnosis

Original Research Article

ROLE OF MAGNETIC RESONANCE IMAGING IN THE ASSESSMENT OF ROTATOR CUFF PATHOLOGIES

Jagadeep MR[1], Satish Babu[2], Suji M[3]

[1]Assistant Professor, Department of Radiodiagnosis, BGS MCH, Nagarur, Dasanapura, Bengaluru North, Adichunchanagiri University, Karnataka, India.
[2]Professor, Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu, India
[3]Consultant Radiologist, Marthandam, Kanyakumari (Dist), Tamil Nadu, India

Received : 13/12/2023
Received in revised form : 25/01/2024
Accepted : 12/02/2024

Keywords:
Acromico-clavicular, Capsular, Labral, Peribiceps, Joint, Tendon.

Corresponding Author:
Dr. Suji M,
Email: jagadeepscans78@gmail.com

DOI: 10.47009/jamp.2024.6.1.253

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (1); 1275-1281

Abstract

Background: Shoulder joint is an elegant anatomic structure. The rotator cuff consists of the supraspinatus, infraspinatus, subscapularis and teres minor muscles and tendons. T here are a number of studies in the literature that look at imaging approaches for detecting rotator cuff abnormalities. The use of magnetic resonance imaging (MRI) in the diagnosis of rotator cuff disorders is crucial. **Materials and Methods:** This study was conducted in the department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu. Total 50 patients were included in the study based on inclusion and exclusion criteria. Study procedure was explained all the patients and informed consent was obtained. Patients demographic, clinical and radiological data was recorded and analyzed. **Result:** In this study of role of MRI in the evaluation of rotator cuff pathology; 50 patients, the patient age ranged from 10 to 75 years; with a mean of 43.1 years. Most patients were between 20 to 40 years of age [20 patients (43%)]. 15 patients (30%) were females and 35 (70%) were males; 37 patients (73%) had symptoms of the right shoulder. In patients with shoulder pain, an insidious onset was noted in 37 patients (73%) and gradual progression in 40 (80%). Acute onset was seen only in 13 patients (26%). The major aggravating position for shoulder pain was shoulder abduction 35 (70%), with pain located in the lateral and posterior aspect of the shoulder in 15 cases. Restriction of shoulder movements was seen in 10 cases. 3 patients (6.7%) had diabetes, 2 patients (3.3%) had hypertension. Four patients (6.6%) had musculoskeletal disease (two had rheumatoid arthritis and two had ankylosing spondylitis). 5 patients (10%) had asymmetry of the shoulder joint and atrophy of shoulder muscles, as compared to other side. Abduction was the most common restricted shoulder movement (63%). The commonest pathology in rotator cuff tendons was partial tear (37-43%), followed by tendinosis (16 to 20%); and full thickness tears (7 to 10%). The most common rotator cuff tendon involved was the supraspinatus tendon (67%), followed by subscapularis (43%) and infraspinatus (10%). 39 patients (67%) had an abnormal supraspinatus tendon. Of these an articular surface partial tear constituted 10 cases (20%), followed by insertion site tendinosis and bursal surface partial tear, which was seen in 9 patients (13%) each. Bursal surface tendinosis and interstitial tears were seen in 10 patients (10%) each. 22 patients (43%) had an abnormal subscapularis tendon in which articular surface tendinosis and articular surface partial tear were seen in 10 cases (10%) each. 5 patients (10%) had abnormal infraspinatus tendon in which 3 of them (6.7%) had complete tears and two had an interstitial partial tear. No teres minor pathology was found. 40 patients had joint effusion. Mild joint effusion was seen in 27 patients (54%), which was more common than moderate joint effusion, seen in 13 patients (26%). Peribiceps tendon fluid was seen in 35 patients (56%), which was more common than subacromial-subdeltoid bursal effusion seen in 15 patients (26%). Most common type of acromion was type II, seen in 33 patients (66%); followed by type I, seen in 11 patients (22%) and type III seen in 6 patients (6). 23 patients (46%) had Acromio-clavicular joint degenerative changes. **Conclusion:** MRI provides

ISSN (O): 2687-5365; ISSN (P): 2753-6556

comprehensive evaluation of the shoulder joint. MRI has lesser artefacts, good soft tissue resolution but has limitations of being time consuming, costly, static and not widely available. However, MRI is excellent in evaluation of labral, capsular or ligamentous pathologies. MRI was better in evaluation of partial rotator cuff tear. MRI plays an important role in the evaluation of rotator cuff pathology as partial tear of rotator cuff, which was the most common rotator cuff pathology.

INTRODUCTION

Shoulder joint is an elegant anatomic structure.[1] The rotator cuff consists of the supraspinatus, infraspinatus, subscapularis and teres minor muscles and tendons.[2] There are a number of studies in the literature that look at imaging approaches for detecting rotator cuff abnormalities. The use of magnetic resonance imaging (MRI) in the diagnosis of rotator cuff disorders is crucial. The combination of good spatial resolution and multiplanar imaging provided by MRI allows for examination of the fine features associated with rotator cuff injuries. Magnetic resonance imaging (MRI) plays an important role in the evaluation of the rotator cuff pathologies.[3-6] MRI provides good spatial resolution together with the multiplanar imaging which allows evaluation of the fine details associated with rotator cuff. Its accuracy is comparable to the ultrasound in diagnosis of the rotator cuff lesions; however, it is not operator dependent like sonography. It has become the imaging method of choice for evaluating the rotator cuff due to its superior ability to demonstrate soft tissue features and its noninvasive nature. Shoulder pain has become a major cause of global morbidity and is an important public problem. Shoulder pain is diagnosed with the radiography, ultrasonography and Magnetic resonance imaging. Primary preferred imaging procedure in the assessment of rotator cuff pathologies is magnetic resonance imaging, because it is noninvasive, no radiation exposure and gives accurate result.[7] The basic parameters evaluated in Magnetic resonance imaging of shoulder are rotator cuff tendons such as supraspinatus, infraspinatus, teres minor and subscapularis, Biceps tendon, glenoidlabrum, acromial process and acromioclavicular joint.[8-9] Magnetic resonance imaging is a valuable tool for diagnosis of shoulder pain due to rotator cuff pathologies and in the assessment of biceps pathology and acromion morphology. Correlating with physical disability will help orthopedicians in early intervention and management of rotator cuff pathologies. Previous studies show magnetic resonance imaging findings of rotator cuff pathologies. This study will assess the role of magnetic resonance imaging in the assessment of rotator cuff pathologies along with biceps pathologies and acromion morphology.[10]This study might establish the role of magnetic resonance imaging findings in the assessment of rotator cuff pathologies. This study will help in better management of patients with shoulder pain and provide better insight in rotator cuff pathologies. Thus, in our study, 50 patients with clinically suspected rotator cuff injury will be subjected to MRI.

MATERIALS AND METHODS

Study Type: Cross sectional study
Study Settings: Department of Radiodiagnosis, Sree Mooakmbika Institute of Medical Sciences, Kulasekharam, Tamil Nadu.
Study Period
Inclusion Criteria

- Patient with history of shoulder pain.
- Clinically suspected to have rotator cuff pathology.

Exclusion Criteria

- Patient contraindicated to MRI.
- Shoulder joint fracture in X-ray.
- Patient not willing or uncooperative for study.
- Previous history of surgery.
- Previous history of recurrent shoulder dislocation.
- Shoulder pain due to infective or neoplastic etiology.

Procedure
After approval of the study protocol by our institutional research & human ethical committee, the patients who fulfill the inclusion criteria included in the study. Whenever patient comes for Magnetic resonance imaging of shoulder pain, written informed consent was taken and patient was explained in detail about the procedure. Magnetic resonance imaging study of shoulder joint was performed once. All shoulder joint with rotator cuff pathologies are assessed on Magnetic resonance imaging 1.5T Siemens ESSENZA 16 channel. The Magnetic resonance imaging findings was assessed. Then all patients were subsequently instructed to duly answer and complete the national translation of the ODI questionnaire. According to the ODI score patients were grouped based on the severity. The role of magnetic resonance imaging in the assessment of rotator cuff pathologies was assessed. Rotator cuff pathologies findings such as subscapularis tendinosis, supraspinatus tendinosis, infraspinatus tendinosis, teres minor tendinosis, subscapularis tear, supraspinatus tear, infraspinatus tear, teres minor tear was assessed using magnetic resonance imaging.
Statistical Analysis
The data was expressed in number and percentage. Statistical Package for Social Sciences (20.0) version used for analysis. Person correlation was

ISSN (O): 2687-5365; ISSN (P): 2753-6556

used for analysis. p value less than 0.05 consider statistical significant at 95% confidence interval.

RESULTS

In this study of role of MRI in the evaluation of rotator cuff pathology; 50 patients, the patient age ranged from 10 to 75 years; with a mean of 43.1 years. Most patients were between 20 to 40 years of age [20 patients (43%)]. 15 patients (30%) were females and 35 (70%) were males; 22 patients (73%) had symptoms of the right shoulder. In patients with shoulder pain, an insidious onset was noted in 37 patients (73%) and gradual progression in 40 (80%). Acute onset was seen only in 13 patients (26%). The major aggravating position for shoulder pain was shoulder abduction 35 (70%), with pain located in the lateral and posterior aspect of the shoulder in 15 cases. Restriction of shoulder movements was seen in 10 (63%). 18 patients (36%) had a past history of fall or trauma to the shoulder joint. 3 patients (6.7%) had diabetes, two patients' (3.3%) had both diabetes and hypertension. Four patients (6.6%) had musculoskeletal disease (two had rheumatoid arthritis and other two had ankylosing spondylitis). 5 patients (10%) had asymmetry of the shoulder joint and atrophy of shoulder muscles, as compared to other side. Abduction was the most common restricted shoulder movement (63%) [Table-1, 2].

The commonest pathology in rotator cuff tendons was partial tear (37-43%), followed by tendinosis (16 to 20%); and full thickness tears (7 to 10%). The most common rotator cuff tendon involved was the supraspinatus tendon (67%), followed by subscapularis (43%) and infraspinatus (10%). 39 patients (67%) had an abnormal supraspinatus tendon. Of these an articular surface partial tear constituted 10 cases (20%), followed by insertion site tendinosis and bursal surface partial tear, which was seen in 9 patients (13%) each. Bursal surface tendinosis and interstitial tears were seen in 10 patients (10%). 22 patients (43%) had an abnormal subscapularis tendon in which articular surface tendinosis and articular surface partial tear were seen in 10 cases (10%). [Table-3,4] 5 patients (10%) had abnormal infraspinatus tendon in which 3 of them (6.7%) had complete tears and one had an interstitial partial tear. No teres minor pathology was found. 40 patients had joint effusion. Mild joint effusion was seen in 27 patients (54%), which was more common than moderate joint effusion, seen in 13 patients (26%). Peribiceps tendon fluid was seen in 35 patients (56%), which was more common than subacromial-subdeltoid bursal effusion seen in 15 patients (26%). Most common type of acromion was type II, seen in 33 patients; followed by type I, seen in 11 patients (20%). 23 patients (46.7%) had Acromio-clavicular joint degenerative changes. Supraspinatus tendon calcification and depression fracture of the humeral head was noted in 2 cases (7%) in USG [Table-5].

Table 1: Distribution of patients based on demographic data

Demographic data	Number	Percentage (%)
Age (Years)		
10-20	5	
21-40	20	
41-60	15	s
Above 60	10	
Gender		
Male	15	30.00
Female	35	70.00
Side of shoulder involved		
Left	13	26.00
Right	37	74.00
Onset of shoulder pain		
Acute	13	26.00
Insidious	37	74.00
Progression of shoulder pain		
Gradual	40	80.00
Sudden	10	20.00
Aggravating position of shoulder pain		
Abduction	35	70.00
No	5	10.00
External rotation	2	4.00
External rotation/Abduction	7	14.00
In all movements	1	2.00
Location of shoulder pain		
Anterior	5	10.00
Lateral	13	26.00
Lateral and Posterior	15	30.00
Posterior	17	34.00

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: Distribution of patients based on clinical data

Clinical data	Number	Percentage (%)
Restriction of shoulder movements		
Yes	10	20.00
No	40	80.00
Inability to bear weight in shoulder		
Yes	18	36.00
No	32	64.00
Trauma or fall on the shoulder		
Yes	18	36.00
No	32	64.00
Past history		
Diabetes mellitus	3	6.00
Diabetes mellitus and hypertension	2	2.00
Fever and chills	2	4.00
Hypertension	2	4.00
Increased pain during swimming	2	4.00
None	39	80.00
Musculoskeletal disease		
Ankylosing spondylitis	2	4.00
Rheumatoid arthritis	2	4.00
None	46	92.00
Asymmetry between the shoulders and atrophy of shoulder		
Yes	5	10.00
No	45	90.00

Table 3: Examination-Restriction of shoulder movements

Characteristic	Category	Mild	Moderate	Severe	Total	Significant
Gender	Male	23	24	20	67	χ2-9.93
	Female	25	39	69	133	Pvalue-0.007
Age(in years)	<20 years	6	5	20	31	χ2-47.57
	21-40 years	9	7	43	59	Pvalue-0.000
	41-60 years	21	27	18	66	
	>60 years	12	24	8	44	
Marital status	married	16	10	23	49	χ2-22.60
	single	19	20	25	64	Pvalue-0.001
	Widow/widower	6	5	22	33	
	Divorced	7	28	19	54	
Religion	Hindu	27	32	43	102	χ2-4.09
	Muslim	15	14	26	55	Pvalue-0.394
	Christian	6	17	20	43	
Education	Primary school	11	12	28	51	χ2-15.04
	Secondary school	13	21	8	42	Pvalue-0.005
	No school	24	30	53	107	
Occupation	Agriculture	20	26	28	74	χ2-2.87
	Home maker	15	19	32	66	Pvalue-0.825
	Service/job	9	11	16	36	
	Unemployed	4	7	13	24	
Socio economic status	Upper middle	17	9	21	47	χ2-12.13
	middle	11	10	20	41	Pvalue-0.05
	Lower middle	8	15	23	46	
	lower	12	29	25	66	
Duration of caregiving	2-5years	24	11	37	72	χ2-22.92
	6-10years	6	7	11	24	Pvalue-0.001
	11-15 years	8	33	22	63	
	16-20years	10	12	19	41	

Table 4: MRI finding subscapularis supraspinatus

MRI finding subscapularis	Number	Percentage (%)
Articular surface tendinosis	5	10.00
Bursal surface tendinosis	2	3.00
Insertion site tendinosis	3	7.00
Complete Tear	3	7.00
Articular surface partial tear	5	10.00
Bursal surface partial tear	2	3.00
Insertion site partial tear	2	3.00
Normal	28	57.00
MRI finding supraspinatus		
Bursal surface tendinosis	5	10.00
Insertion site tendinosis	7	14.00
Insertion site tendinosis + Complete tear	2	4.00
Complete Tear	3	6.00

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Articular surface partial tear	10	20.00
Bursal surface partial tear	7	14.00
Interstitial partial tear	5	10.00
Normal	11	22.00

Table 5: Distribution of patients based on MRI findings supraspinatus

MRI findings-Supraspinatus	Number	Percentage (%)
Bursal surface tendinosis	5	10.00
Insertion site tendinosis	7	14.00
Insertion site tendinosis + Complete tear	2	4.00
Complete Tear	3	6.00
Articular surface partial tear	10	20.00
Bursal surface partial tear	7	14.00
Interstitial partial tear	5	10.00
Normal	11	22.00
Total	**50**	**100.00**

DISCUSSION

The most prevalent condition of the shoulder joint is rotator cuff pathology, and accurate diagnosis is critical for effective treatment.[11] For both rotator cuff and non-rotator cuff problems, MRI is an effective imaging modality. The purpose of this study is to determine the role of MRI in rotator cuff diseases. This is a cross-sectional research that looked at 50 people who had shoulder pain. A history and clinical examination were conducted first, followed by a shoulder MRI.

Age wise distribution of rotator cuff pathologies

The age of the patients with rotator cuff pathologies studied ranged from 10-75 years, with a mean of 43.10 + 2.08. While 20 of cases were from 21 to 40 years of age (43%), 15 cases were from 41 to 60 years of age (33%). In compared to study conducted Pavic et.al.,[12] of total 200 cases, mean age of patients was 39 (range from 15 to 83). Various literatures have pointed out that the incidence of rotator cuff tendon degeneration and injury increases with age [13]. Rotator cuff disease is multifactorial, both extrinsic and intrinsic factors have been implicated. Intrinsic factors like poor vascularity, alteration in material composition and properties with aging have been studied. Ozaki et al and Uhthoff,[14] believe that the pathogenesis of rotator cuff disorders is an intrinsic process and the risk of rotator disorder increases with aging. Micro vascular studies have showed diminished vascularity in the cuff tissue with increased age which appears consistent with the pattern of degeneration observed in age related degenerative tendinopathies. In the study conducted by Needell et.al.,[15] in 100 asymptomatic shoulders, a higher incidence of tendinosis was found among younger population against more tears in the older group in the fifth and sixth decade of life. There is no such difference was found in our study.

Gender wise distribution of rotator cuff diseases

Of the 50 patients studied, 15 were females (30%) and 35 were males (70%). The mean age among females was 45.1 and the mean age among males was 42.2 years. In study done by Zhang et.al.,[16] female patients are less in compared to male patients, similar to our study. This may be related to occupation and physical activity which varies in relation to gender leading to shoulder pathology. There is no statistically significant difference in the incidence of rotator cuff lesions related to gender in our study.

Onset and progression of shoulder pain

Pain is the most frequently associated complaint in rotator cuff pathology. It is usually located over the anterior, superior and lateral aspects of the shoulder. Pain usually is minimal at rest in a neutral and supported position of the arm. The pain is typically exacerbated with overhead raising or abduction of arm as in combing hair, especially when lifting against resistance. Weakness may be a manifestation of either pain inhibition or muscular fatigue. True weakness often presents as an inability to raise the arm above the shoulder level. Stiffness or decreased range of motion may be secondary to pain or weakness of the rotator cuff. In our study, insidious onset was noted in 37 patients (74%) and gradual progression in 40 patients (80%) of shoulder pain which were more common than acute onset which was seen only in 13 patients (8%). The major aggravating position for shoulder pain was shoulder abduction 35 (70 %), with pain located in the lateral and posterior aspect of the shoulder in 15 cases. The average duration of shoulder pain in our study in 6 months; there is no association between duration of shoulder pain with severity of rotator cuff disorder. This finding is correlating with study done by M.S.G., et.al.,[17] which shows there is only weak relationship between the duration of symptoms and features associated with rotator cuff disease. Restriction of shoulder movements was seen in 10(63%) patients of 50 patients, 18(36%) had history of fall or trauma to the shoulder.

Past History

Of 50 patients, 3(6%) had diabetes and 2(4%) have previous history of shoulder dislocation 1 month before. Four patients (7%) had musculoskeletal disease, two had Rheumatoid arthritis, and other two had ankylosing spondylitis. The studies conducted by Abate M, et.al.,[18] age related degenerative changes are common in diabetes. In our study, there are 3 diabetic patients, another two patient had both diabetes and hypertension, hence of total 5 patients

ISSN (O): 2687-5365; ISSN (P): 2753-6556

with diabetes two patients had articular surface partial tear and one patient had complete tear. Although total 3 diabetic patients had high grade tear, but the total data is insufficient to compare with non-diabetic patient. Young patient in our study was 10 years of age who is known case of Rheumatoid arthritis, presenting with insertion site tendinosis of supraspinatus tendon and complete tear of subscapularis tendon and axillary lymph node in MRI.

Examination

On examination, 5 patients (10%) had asymmetry of the shoulder joint and atrophy of shoulder muscles as compared to other side. Abduction movement was the most common restricted shoulder movement seen in 18 patients (63%). The finding was similar to study done by Litaker D., et.al.,[19] in which history and physical examination done in 301 patients, atrophy, difficulty or weakness in abduction or external rotation, arc of pain and night pain are features which help in diagnosing rotator tears clinically. Most common cuff tendon involved in our study was supraspinatus tendon 39 (67%), followed by Subscapularis 22 (43%) and infraspinatus 5 (10%).

Tendinosis

Supraspinatus tendinosis: Among 14 cases of Supraspinatus tendinosis, five cases are bursal surface tendinosis and 2 cases are insertion site tendinosis.

Subscapularis tendinosis: Among 10 cases of Subscapularis tendinosis, two cases of bursal surface tendinosis and 3 cases of insertion site tendinosis.

Rotator cuff tears

Supraspinatus tear: Among 25 cases of Supraspinatus tear in MRI, 3 cases are complete tear and 5 cases of interstitial partial tear and 7 cases of bursal surface partial tear.

Subscapularis tear: Among 12 cases of Subscapularis tear in MRI, 3 cases are complete tear, 5 cases of articular surface partial tear and 2 cases of bursal surface partial tear.

Infraspinatus tear: Among 5 cases of Infraspinatus tear, 3 cases are complete tear and 2 cases are interstitial partial tear.

Teres Minor: In a study conducted on 2436 shoulder MRI examinations for a period of 67-months period from September 1996 to April 2002. MRI findings of Teres minor abnormality were seen in 0.8% only among the study population. No teres minor pathology was found in our study. [40]

Bicipital Tendon abnormality and rotator cuff diseases

In our study, of the 50 patients with rotator cuff disease, 35(76%) had abnormal biceps tendon. Of these abnormal biceps tendons, tendinosis was seen in 2(3.3%), fluid around the biceps tendon was seen in 35(70%) and dislocated biceps tendon was seen in 2(3.3%) patients.Erickson et al in their study showed bicipital tendinitis/tenosynovitis was frequently accompanied rotator cuff disease.[20] Rotator cuff disorders, especially in complete tears, the long head of bicipital tendon can get impinged between the humeral head and the coracoacromial arch. This can result in flattening of biceps tendon, tendinitis, partial tears and overt rupture. Beall et al in a study done in 111 patients with shoulder pain who underwent both MR and surgery, found 23 patients with bicipital tendon abnormality. They concluded tears of long head of biceps tendon had a statistically significant association with tears of the supraspinatus and subscapularis components of the rotator cuff. It was also found relationship between acromio-humeral impingment and the adverse effects on both the biceps tendon and superior rotator cuff.

Joint effusion and rotator cuff diseases

In our study, 40(86.7%) patient had joint effusion in MRI. In MRI mild joint effusion and peribiceps tendon fluid is more common than moderate subacromial-subdeltoid bursal effusion.

Acromion Types

Acromion is classified as type I to IV, flat, curve inferior surface, hooked and convex near the distal end. Most common type of acromion in our study was type II seen in 33(66%) patients, followed by type I seen in 11(22%). In a study conducted by Musil et.al., says relationship between the type of acromion and rotator cuff tears. In a study conducted Hamid et al, association between the acromial spur and full thickness rotator cuff tear is shown. However, in our study there is no relationship between the type of acromion and rotator cuff tear. [21]

Acromio-clavicular joint degenerative changes

In our study among 50 cases, 23 patients had ACJ degenerative changes. In a study by Needel et.al in 100 patients acromio-clavicular joint degenerative changes increased with age. More than 80 % patients with partial tear and the entire patient with full thickness had acromio-clavicular joint arthrosis. In our study there was no significant association between acromio-clavicular joint degenerative changes and rotator cuff tear seen.[15]

Labrum and rotator cuff diseases

An overlap of symptoms exists among patients with a glenoid labral lesion and those with rotator cuff disorder or glenohumeral instability. A labral tear can result as a result of trauma like in patients who engage in overhead throwing athletic sport activities, or secondary to degenerative changes in the labrum leading on to tear. In a study conducted by Glenn et.al., on 41 a patient with arthroscopy proven labral tear, it was found 68% patients had both labral and rotator cuff tears.[22] Rotator cuff tears and long head of biceps tendinopathy may accompany a superior labral tear. Both chronic overuse tears of the postero-superior labrum and articular-side partial tears of the supraspinatus and infraspinatus tendons may result from internal impingment in the overhead position. In our study 23 patients out of 50 had labral pathology (47%) in MRI, in which posterior part of the labrum is most involved than anterior part of the labrum. There is

ISSN (O): 2687-5365; ISSN (P): 2753-6556

no significant association between labral pathology and rotator pathology noted which is contradictory to literature.

CONCLUSION

MRI is the imaging modality for evaluation of abnormalities of the shoulder joint. MRI provides comprehensive evaluation of the shoulder joint. MRI has lesser artefacts, good soft tissue resolution but has limitations of being time consuming, costly, static and not widely available. However, MRI is excellent in evaluation of labral, capsular or ligamentous pathologies. MRI was better in evaluation of rotator cuff pathologies.

REFERENCES

1. Wiener SN, Seitz WH, Jr. Sonography of the shoulder in patients with tears of the rotator cuff: accuracy and value for selecting surgical options. AJR American journal of roentgenology 1993;160(1):103-7.
2. Teefey SA, Middleton WD, Payne WT, Yamaguchi K. Detection and measurement of rotator cuff tears with sonography: analysis of diagnostic errors. American Journal of Roentgenology 2005;184(6):1768-73.
3. Umans HR, Pavlov H, Berkowitz M, Warren RF. Correlation of radiographics and arthroscopic findings with rotator cuff tears and degenerative joint disease. Journal of shoulder and elbow surgery/ American Shoulder and Elbow Surgeons 2001;10(5):428-33.
4. Kneeland JB, Middleton WD, Carrera GF, Zeuge RC, Jesmanowicz A, Froncisz W, et al. MR imaging of the shoulder: diagnosis of rotator cuff tears. American journal of roentgenology 1987;149(2): 333-7.
5. de Jesus JO, Parker L, Frangos AJ, Nazarian LN. Accuracy of MRI, MR arthrography and ultrasound in diagnosis of rotator cuff tears: a meta-analysis. AJR American journal of roentgenology 2009;192(6):1701-7.
6. Dinnes J, Loveman E, Mc Intyre L, Waugh N. The effectiveness of diagnostic tests for the assesment of shoulder pain due to soft tissue disorders: a systemic review. Health technology assessment 2003;7(29):1-166.
7. Post M, Silver R, Singh M. Rotator cuff tear. Diagnosis and treatment.ClinOrthopRelat Res 1983;173:78-91
8. Chaudhari P, Chitnis A. Role of MRI in Evaluation of Shoulder Pain. Paripex - Indian Journal of Research 2017;6 (1):21-3
9. Abdelrahman ME, Altahhan HA, Abdelraoof MM. Role of MRI in Diagnosis of Rotator Cuff Tears. The Egyptian Journal of Hospital Medicine 2018;71(2):2573-80.
10. Nelson MC, Leather GP, Nirschl RP, Pettrone FA, Freedman MT. Evaluation of the painful shoulder. A prospective comparison of magnetic resonance imaging, computerized tomographic arthrography, ultrasonography and operative findings. The Journal of bone and joint surgery/ American volume 1991;73(5):707-16.
11. Greenberg DL. Evaluation and treatment of shoulder pain. The Medical clinics of North America 2014;98(3):487-504.
12. Pavic R, Margetic P, Bensic M, Brnadic RL. Diagnostic value of US, MR and MR arthrography in shoulder instability injury 2013:44(3):26-32.
13. Bergman AG. Rotator cuff impingment pathogenesis. MR imaging characteristics, and early dynamic MR results. Magnetic resonance imaging clinics of North America 1997;5(4):705-19.
14. Ozaki J, Fujimoto S, Nakagawa Y, Masuhara K, Tamai S. Tears of the rotator cuff of the shoulder associated with pathological changes in the acromion. A study in Cadavera. The Journal of bone and joint surgery American 1988;70(8):1224-30.
15. Needell SD, Zlatkin MB, Sher JX, Marphy BJ, Uribe JW. MR imaging of the rotator cuff: peritendinous and bone abnormalities in an asymptomatic population. AJR American Journal of Roentegenology 1996;166(4):863-7.
16. Zhang C, Guo L, An N, Liu GH, Zhu YT, Fan LZ. [Application value of the high frequency ultrasound on the diagnosis of rotator cuff tears]. Zongguogushang = China Journal of orthopaedics and traumatology 2013;26(9):784-6.
17. The MSG, Uneruh KP, Kuhn JE, Sanders R, An Q, Baumgarten KM, et al. The duration of symptoms does not correlate with rotator cuff tear severity or orthe patient-related features: a cross-sectional study of patients with atraumatic, full-thicknesss rotator cuff tears. Journal of shoulder and elbow surgery/Americal Shoulder and Elbow Surgeons 2014;2(4):15-20.
18. Abate M, Schiavone C, Salini V. Sonographic evaluation of the shoulder in asymptomatic elderly subjects with diabetes. BMC musculoskeletal disorders 2010;11:278.
19. Litaker D, Pioro M, El bilbeisi H, Brims J. Returning to the beside: using the history and physical examination to identify the rotator cuff tear. Journal of the American Geriatrics society 2000;48(12):1633-7.
20. Ericksion SJ, Fitzgerald SW, Quinn SF, Carrera GF, Black KP, Lawson TL. Long bicipital tendon of the shoulder: normal anatomic and pathologic findings on MR imaging. AJR American Jounal of Roentegenology 1992;158(5)1091-6.
21. Grainger AJ, Tirman TF, Elliott JM, Kingzett-Tailor A, Steindach LS, Genant HK. MR anatomy of the sub coracoid bursa and the association of sub coracoids effusion with tear of the anterior rotator cuff and the rotator interval. AJR American Jounal of Roentegenology 2000;174(5):1377-80.
22. Tempelhof S, Rupp S, Seil R. Age related prevalence of rotator cuff tears in asymptomatic shoulders. Journal of shoulder and elbow surgery/Americal Shoulder and Elbow Surgeons 1999;8(4):296-9

ISSN (O): 2687-5365; ISSN (P): 2753-6556