VOLUME - 9, ISSUE - 11, November - 2020 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Radiodiagnosis

ROTATOR CUFF INJURY - ROLE OF MRI & COMPARING ITS DIAGNOSTIC ACCURACY WITH USG

Dr. Vaibhav Bhandari*	PG Resident DVVPF Medical College. *Corresponding Author
Dr. Dilip Lakhkar	Professor, Radio-diagnosis DVVPF Medical College
Dr. Sushil Kachewar	HOD& Professor, Radio-diagnosis DVVPF Medical College

ABSTRACT Rotator cuff injuries are one of the most common cause of shoulder pain mostly in older patients. Its prevalence increases with age. It can have various subtypes which includes partial thickness rotator cuff tear, full thickness rotator cuff tear and etc. These pathologies can be identified radiologically specially using USG & MRI. USG is a useful non-invasive, dynamic modality having high sensitivity, specificity and accuracy in the diagnosis of rotator cuff tears. Good correlation existed between findings at USG imaging and those at MRI in assessment of partial as well as full thickness rotator cuff tears with MRI being slightly superior. MRI can also delineate other structural changes like labral tears. Overall MRI is better than USG for SASD, impingement and calcific tendinitis as well. Thus in the evaluation of rotator cuff injuries ultrasonography is the primary imaging modality, however MRI continues to remain the gold standard in accurate localization , characterization and assessment of rotater cuff injuries.

KEYWORDS : Rotator cuff injury, MRI, USG, diagnostic accuracy

INTRODUCTION

The shoulder joint relies on a variety of structures for stability, including the osseous glenoid, the fibrous labrum, the joint capsule, the glenohumeral ligaments, and most importantly the rotator cuff which is formed by four tendons. Spectrum of etiologies that can give rise to shoulder pain are cuff defects – partial and full thickness, acute and chronic, traumatic and degenerative. Others are degenerative cuff failure, impingement syndromes, tendinitis, tendinopathy, subacromial abrasion. Rotator cuff injury is the most common lesion of shoulder and early and accurate diagnosis is essential for appropriate management.[1]

Ultrasonography was introduced in musculoskeletal imaging since 1977 and with the help of USG it became possible to evaluate any tear, whether partial or full thickness. Since its introduction to musculoskeletal imaging in the early 1980s, MRI has revolutionized diagnostic imaging of the shoulder. This innovative technology allows superior soft tissue detail with multiplanar imaging capability that provides accurate evaluation of the intra/extra-articular structures of the shoulder not demonstrated with other imaging modalities. MRI has become the "gold standard" for detecting both subtle and obvious internal derangement and assessing overall joint structure.[2]

In our study thirty patients with shoulder joint pain, and clinical suspicion of rotator cuff injuries were subjected to USG and MRI of the shoulder joint.

AIMS AND OBJECTIVES -

1. To detect the rotator cuff injury in clinically suspected patients using high resolution ultrasonography.
2. To enumerate MRI findings in these patients.
3. To compare the diagnostic efficacy of ultrasound and MRI.

OBSERVATIONS

TABLE - 1

Age	sex	Clinical Features	Rotator cuff tendon
30-40 9(30%)	males 18(60%)	Pain 29(96.6%)	Supraspinatus 27(90%)
41-50 10(33.3%)	females 12(40%)	Diabetes 10(33.3%)	Subscapularis 2(6%)
51-60 7(23.3%)		Trauma 4(13.3%)	infraspinatus 1(3%)
>60 4(13.3%)		Restriction of movement 11(36.6%)	teres minor 0(0%)

TABLE - 2

Type of lesion	USG	MRI	Total cases	Accuracy on USG	Accuracy on MRI
full thickness tears of the rotator cuff	5	7	6	93.3%	96.6%
Partial thickness tears	12	14	14	80%	93.3%
labral tears bankart SLAP	0	8 4 4	7 4 3	-	100% 96.6%
subacromial subdeltoid bursitis	16	23	23	76.6%	100%
subacromial impingement	4	5	6	93.3%	96.6%
Calcific supraspinatus tendinitis	2	3	3	96.6%	100%

DISCUSSION

In our study, the most common age group of patients was in the 41-50 years range constituting 33% of the cases, with the mean age of 44.5 years. Males were the majority of the patients around 60 %. Majority (93%)patients in our study had right hand dominance. These results are in concordance with the observations seen by Urwin M et al. who proposed that rotator cuff tears tend to prevail in the dominant arm.[5]

The most common presenting complaint was pain in shoulder joint seen in 96 %, followed by restriction of movement constituting 54% of cases. Trauma was associated in 10 patients(33.3%). A history of diabetes was present in 4 (13.3%) of our patients.

Rotator cuff pathologies were the commonest cause of painful shoulder in our study. The pathologies included partial, full thickness tears and tendinosis.

Supraspinatus tendon was the commonest tendon to be involved in our study(90%).This is comparable to the study by Zlatkin et al where in they found that supraspinatus tendon involvement was present in majority of their cases.[7]

Subscapularis tear was found in only 1 case constituting 3.3 % of the cases. Similar result was obtained by Codman et al. who found subscapularis involvement to be 3.5%. And this tear was associated with supraspinatus tear in our study. Isolated subscapularis tears are very rare. Deutsch A et al concluded similar findings.[6] Infraspinatus was involved in 1 case.

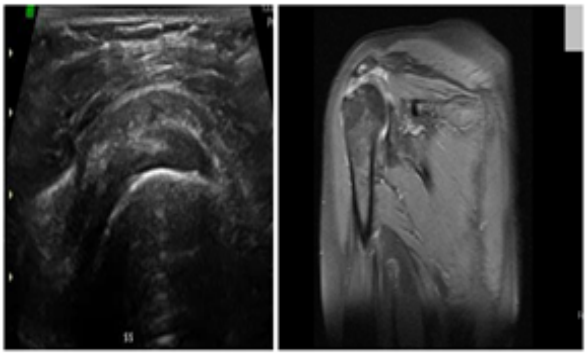
Partial thickness rotator cuff tears:

In our study, 10(30%) cases had partial thickness tears of supraspinatus and 2 cases(6.6%) had partial thickness tears of subscapularis on USG. While 11 cases(36%) had partial thickness tears of supraspinatus and 2 cases(7%) had partial thickness tears of subscapularis and 1 case(3%) had partial thickness tear of infraspinatus on MRI.

The sensitivity, specificity and accuracy for detecting partial thickness rotator cuff tears for USG were 72%, 87.5%, and 80% respectively which were corresponding to the study of Shoubhi et al.[15] While the sensitivity, specificity and accuracy for detecting partial thickness rotator cuff tears for MRI were 92.3%,94% and 93.3% respectively which were corresponding to the study of Shoubhi et al and Vlychou M et al.[10]

In our study, on USG there were 2 false positive cases probably due to anisotropy related artifacts and 4 false negative cases.

In our study, the 1 false negative MRI involved the subscapularis tendon.



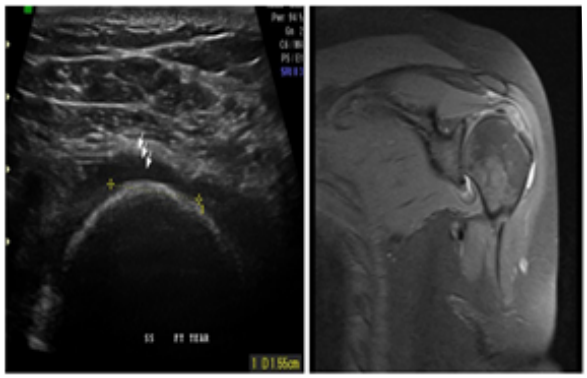
PARTIAL THICKNESS SUPRASPINATUS TEAR ON USG & PARTIAL THICKNESS SUPRASPINATUS TEAR ON MRI(CORONAL PD FS)

FIG - 1Full thickness rotator cuff tears:

In our study, 5 cases(16.7%) had full thickness supraspinatus tears on USG while 7(23%) had full thickness supraspinatus tears on MRI.

The sensitivity, specificity and accuracy for detecting full thickness rotator cuff tears for USG were 83.3%, 95.8% and 93.3% respectively while the sensitivity, specificity and accuracy for detecting full thickness rotator cuff tears for MRI 100%,95.8% and 96.6% respectively which were corresponding to the to the study of Lenza et al.[14] and Shoubhi et al.[15]

In our study, on USG there was 1 false positive cases probably due to anisotropy related artifacts and 1 false negative case while the 1 false positive MRI was found probably due to magic angle artifact involving the distal most supraspinatus tendon.



FULL THICKNESS SUPRASPINATUS TEAR ON USG &FULL THICKNESS SUPRASPINATUS TEAR ON MRI(CORONAL PD FAT SAT)

FIG - 2

Labral tears:

In our study, out of 30 patients 8 cases(26.6%) on MRI showed the presence of labral tears. Of these 4 were Bankart lesions and 4 were SLAP tears. On follow up there were total 4 Bankart lesions and 3 SLAP tears. The labral tears were not detected on USG in our study because of inability to adequately visualize the cartilaginous labrum on USG.

The sensitivity, specificity and accuracy for detecting Bankart lesions for MRI were 100%, 100%, and 100% respectively which were corresponding to the study of Joseph P Iannoti et al[9]. While for detecting SLAP tears were 100%, 96.4%, and 96.6% respectively which were corresponding to the study of Connel et al.[16]

Subacromial subdeltoid bursitis:

In our study, 16(53%) cases on USG had subacromial subdeltoid bursitis while MRI detected subacromial subdeltoid bursitis in 23(76%) cases. No cases of subcoracoid bursitis were detected on USG while MRI detected it in 12(80%) of cases.

The sensitivity, specificity and accuracy for detecting SASD for USG were 70%,100%, and 76.6% respectively while the sensitivity, specificity and accuracy for detecting SASD for MRI were 100%,100%, and 100% respectively which were corresponding to the study of Shrestha et al[13]. Thus MRI is a better modality than USG in picking up SA-SD bursitis.

Peribicipital fluid:

In our study, 19(63%) cases on USG had peribicipital tendon fluid while MRI detected peribicipital tendon fluid in 24(80%) cases. Thus MRI is more sensitive than USG in detecting peribicipital tendon fluid. This is in concordance with the findings of Mary Hollister et al.[11]

Impingement:

In our study, five patients(16.6%) had subacromian impingement on MRI, whereas USG picked up 4 cases.

The sensitivity, specificity and accuracy for detecting impingement for USG were 66.6%,100%, and 93.3% respectively while the sensitivity, specificity and accuracy for detecting impingement for MRI were 83.3%,100%, and 96.6% respectively which were corresponding to the study of Farin et al[12]. and Nathalie et al.[8]

MRI was also used to determine the types of acromion. Type II acromion was the most common type to be detected on MRI(50%) of cases.

Calcific tendinitis:

In our study, three patients(10%) had supraspinatus calcific tendinitis on MRI, whereas USG picked up 2 cases of calcification.

The sensitivity, specificity and accuracy for detecting calcific tendinitis for USG were 66.6%,100%, and 96.6% respectively while the sensitivity, specificity and accuracy for detecting calcific tendinitis for MRI were 100%,100%, and 100% respectively which were corresponding to the study of Shrestha et al.[13]

CONCLUSIONS

From our study, we found that, though operator dependent, a well performed USG can effectively serve as a primary screening method of all painful shoulder joints because it is economic and fast. USG is almost equally effective as MRI for rotator cuff tears but not for other pathologies.

MRI should be used for assessment of overall joint including labral, capsular or ligamentous pathologies.

MRI because of its superior soft tissue resolution with multiplanar imaging capability needs to be done especially before planning surgery.

Hence USG can be used as a first line of investigating a case of shoulder joint pain to rule out rotator cuff pathologies but MRI is the gold standard in evaluation of rotator cuff pathologies because MRI is the most sensitive and specific modality for the establishment of shoulder pain. MRI is also highly sensitive for labral tears, in picking bursal fluid, impingement as well as calcific tendinitis.

REFERENCES:

1. Naredo E, Aguado P, De Miguel E, Uson J, et al. Painful shoulder: comparison of physical examination and ultrasonographic findings. Ann Rheum Dis 2002; 61:132–136.
2. Arun Kinare. Musculoskeletal Ultrasound Symposium. Indian J Radiol and Imaging 2007; 17(3):194-200.
3. Bigliani LU, Ticker JB, Flatow EL, Soslowsky LJ, Mow VC. The relationship of acromial architecture to rotator cuff disease. Clin Sports Med. 1991; 10(4):823-38.
4. Bernard Mengiardi, Christian W. A. Pfirrmann, Christian Gerber, Jurg Hodler, Marco Zanetti. Frozen Shoulder: MR Arthrographic Findings. Radiology 2004; 233: 486–492.
5. Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites and the relation to social deprivation. Ann Rheum Dis 1998; 57:649-655.
6. Zlatkin MB. Rotator cuff tears, diagnostic performance of MRI. Radiology 1989;172: 223-229.
7. Deutsch A, Altchek DW, Veltri DM, et al. Traumatic tears of the subscapularis tendon: Clinical diagnosis, magnetic resonance imaging ?ndings,and operative treatment. Am J Sports Med 1997;25: 13-22.
8. Nathalie J. Bureau, Marc Beauchamp, Etienne Cardinal, Paul Brassard. Dynamic Sonography Evaluation of Shoulder Impingement Syndrome. AJR 2006; 187:216–220.
9. Iannotti JP, Zlatkin MB, Esterhai JL et al. MRI of the shoulder: Sensitivity, specificity and predictive value. J Bone Joint Surg Am. 1991; 73:17-29.
10. Vlychou M, Dailiana Z, Fotiadou A, Papanagiotou M, Fezoulidis IV, Malizos K Symptomatic Partial Rotator Cuff Tears: Diagnostic Performance of Ultrasound and Magnetic Resonance Imaging with Surgical Correlation. Acta Radiol. 2009; 50(1):101-5.
11. Hollister MS, Mack LA, Patten RM, et al: Association of sonographically detected subacromial/subdeltoid bursal effusion and intraartcular fluid with rotator cuff tear. AJR Am J Roentgenol 1995 Sep; 165(3): 605-608.
12. Farin PU, Jaroma H, Harju A, Soimakallio S. Shoulder impingement syndrome:sonographic evaluation. Radiology. 1990; 176(3):845-9.
13. Shrestha MS, Alam A. A Comparative Evaluation of Rotator Cuff Injuries of the Shoulder joint using High Resolution ultrasound and MRI. Medical Journal of Shree Birendra Hospital 2011;10(1):9-14.
14. Mário Lenza, Rachelle Buchbinder, Yemisi Takwoingi, Renea V Johnston, Nigel C A Hanchard, Flávio Faloppa Magnetic resonance imaging, magnetic resonance arthrography and ultrasonography for assessing rotator cuff tears in people with shoulder pain for whom surgery is being considered. Cochrane Colloboration 2013:CD009020.pub2
15. Shoubhi Bhatnagar, Rajesh Kuber, Digish Shah. The role of ultrasound and MRI in evaluation of musculo-tendinous pathologies of the shoulder joint. WAJR 2014;21(2):68-74.
16. Connell DA, Potter HG,Wickiewicz TL, Altchek DW, Warren RF. Non contrast MRI of superior labral lesions:102 cases confirmed at arthroscopic surgery. Am J Sports Med 1999;27:208-13.