RESEARCH PAPER | Medical Science | Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Ultrasound And Mri Correlation of Rotator Cuff Injuries

KEYWORDS: Rotator cuff injury, USG, MRI.

Dr.Kunal Kalyanrao Patil
IIIrd year resident, Department of Radiodiagnosis, Bharati Vidyapeeth Deemed University, Medical college, Pune, Pin Code 411043.

Dr.Nagesh. D.N. Seth
Associate Professor, Department of Radiodiagnosis, Bharati Vidyapeeth Deemed University, Medical college, Pune, Pin Code 411043

Dr.Priscilla Joshi
Professor and Head of Department, Department of Radiodiagnosis, Bharati Vidyapeeth Deemed University, Medical college, Pune, Pin Code 411043

ABSTRACT *To evaluate role of USG and MRI in rotator cuff injuries. Method and Materials: 50 patients with clinically suspected rotator cuff pathology underwent X-ray, ultrasonography and MRI of the affected shoulder. Ultrasound findings were compared with gold standard MRI. Results: The accuracy in detection of full thickness tear was 72% and 76% for ultrasonography and MRI respectively. Conclusion: ultrasound should be considered as initial investigation in rotator cuff injuries followed by MRI in doubtful cases.*

Introduction

The shoulder joint is an incongruous, (large) ball and (small) socket joint, without any fixed axis of rotation and has a wide range of motion in multiple planes - stability is compromised for mobility. The muscles and their tendons are subjected to severe strain causing excessive "wear and tear" during sports and games activities. The spectrum of causative lesions that can give rise to shoulder pain range from acute trauma to degenerative disorders as well as impingement syndrome.. Although a number of clinical tests are described for diagnosing painful shoulder, considered accurate in determining the location of periarticular lesions, shoulder pathology may be difficult to diagnose by physical examination alone.[1] Clinical diagnosis notoriously has low accuracy in comparison with arthroscopy.[1,2]

Rotator cuff injury has a distinct range of chronic disorders, which are intrinsic to the musculotendinous and osseo-tendinous part of the Rotator cuff and the anatomically narrow sub-acromial space. Hence, ultrasound examination is most commonly requested. Improvement in the resolution of ultrasound machines, redefined technique and better understanding of the pathology has contributed to its high accuracy in the diagnosis of rotator cuff pathology. High-resolution ultrasound is a non-invasive, less expensive and non-ionizing modality with good sensitivity in detecting both rotator cuff and non rotator cuff disorders.[3]

Plain film radiography remains the basic initial investigation for assessing bony trauma and most athropathies. It has to be supplemented by other techniques, like arthrography and modalities primarily meant for diagnosing soft tissue abnormalities. Magnetic Resonance Imaging and Ultrasonography have supplanted arthrography in the evaluation of the integrity of the rotator cuff.[4] Magnetic Resonance arthrography is reserved for the investigation of instability.[5] MRI has become the "gold standard" for detecting both subtle and obvious internal derangement and assessing overall joint structure.[3] MRI is an excellent modality because of its multiplanar capability and exciquite soft tissue detail.

Over the last two decades musculoskeletal USG has established itself as a versatile imaging modality in the fields of sports medicine and rheumatology. It has gained its rightful place in literature along with MRI. The real time capability of ultrasound in conducting dynamic studies in the shoulder is a great asset since patient is able to interact and express discomfort caused by a particular movement or position.

In our study fifty patients with shoulder joint pain, with a clinical suspicion of rotator cuff injuries were subjected to X-ray (AP), USG and MRI of the shoulder joint. Our aim was to show that ultrasound examination was as effective as MRI in the evaluation of shoulder pain, especially in cases of rotator cuff injuries.

methods and materials

This is a prospective study conducted in the department of Radiodiagnosis and imaging, Bharati hospital, Pune. Our Institutional ethics committee approved the study protocol and informed consent was obtained from each patient before X-ray/USG/MRI study.

50 patients with acute or chronic shoulder pain found suspicious of rotator cuff tear by orthopedician were referred for USG and MR evaluation. Examination conducted on

1. Phillips IU22 machine using linear probe of frequency range 7-12 MHz.

2. Phillips Achieva 1.5 T superconducting magnet

Imaging parameters performed during MR examination-

3. The slice thickness – 5mm Field of view (FOV)- 16 to 20 cm. Sequences performed were: Oblique coronal: STIR-coronal / sagittal. T1W- coronal / sagittal / axial.PD FS-coronal / sagittal / axial.

X-Rays were evaluated for soft tissue calcification

Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

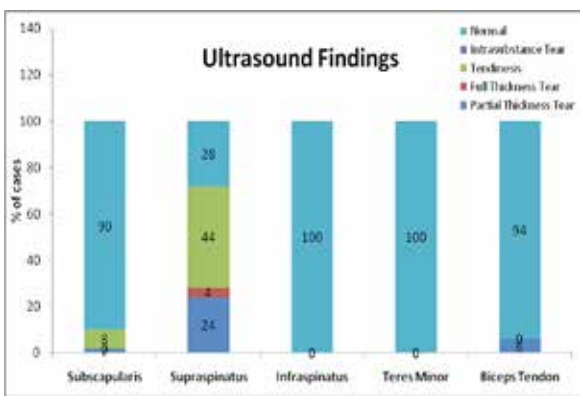
Inclusion Criteria:
- All patients in any age group.
- All patients with shoulder pain, restriction of movements of shoulder and suspected rotator cuff injuries.

Exclusion criteria:
- Other trauma/ open wounds.
- Malignant and infectious conditions.
- Patient having a history of claustrophobia.

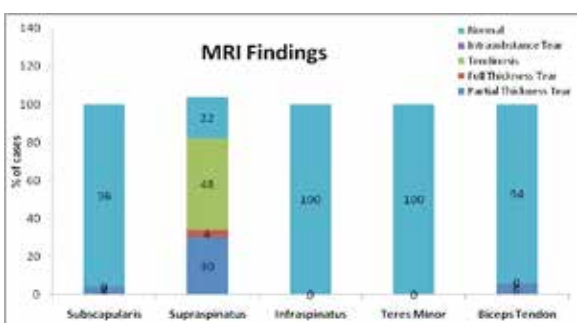
Patient having a history of metallic implant or cardiac pacemaker insertion or any metallic foreign body embedded in the tissues

statistical anlysis
Results are calculated using chi square test and bar charts were obtained using the statistical software.

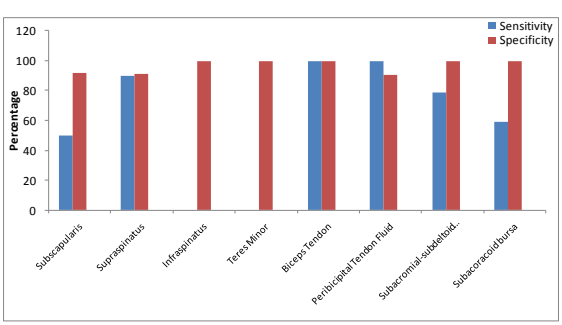
observation and results



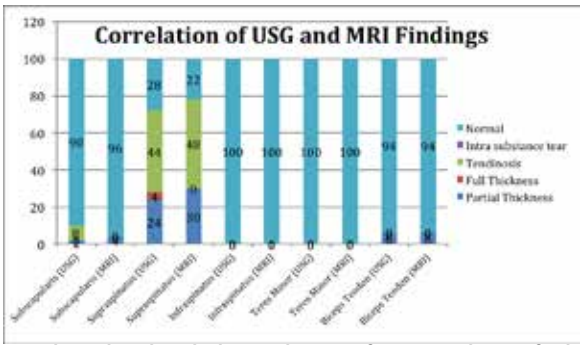
Graph 1: The distribution of Ultrasound findings (n=50).



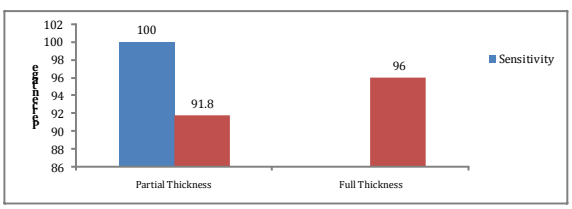
Graph 2: The distribution of MRI findings (n=50).



Graph 3: The sensitivity and specificity analysis of USG against MRI (Gold Standard) (n=50).

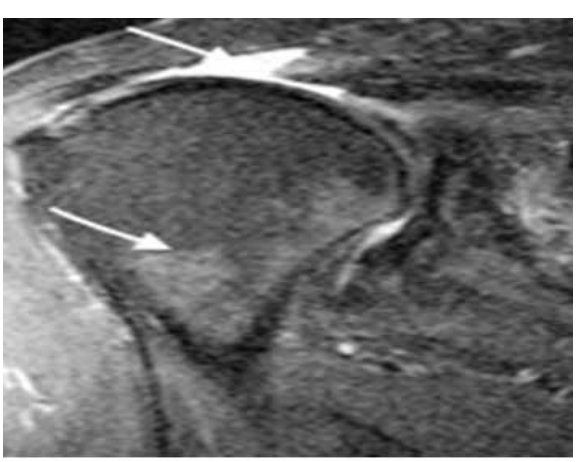


Graph 4.The detailed correlation of USG and MRI findings (Gold Standard) (n=50):



Graph 5. The sensitivity and specificity analysis of USG against MRI (Gold Standard) (n=50).

A.



B.

A. USG shows fullthickness tear of supraspinatus tendon with tendon retraction and free fluid.
MRI STIR coronal image shows fullthickness tear of supraspinatus tendon with tendon retraction, free fluid and marrow edema in head of the humerus.

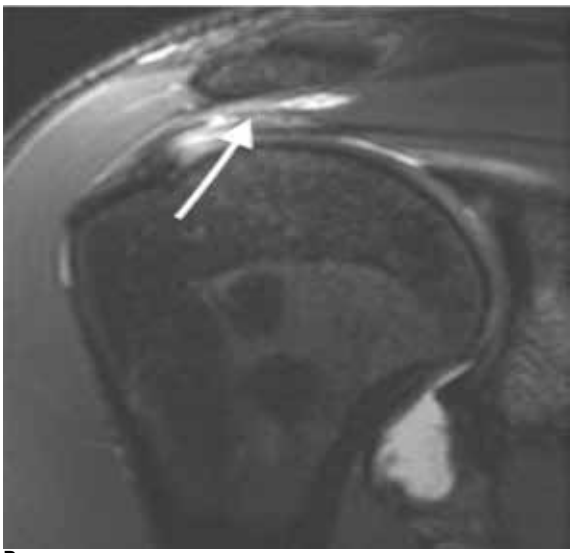
Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

A.

B.

A.UGS shows partial thickness teas of supraspinatus tendon at articular surface. B. MRI STIR coronal image shows a hyperintense signal at the articular surface suggestive of partial thickness tear.

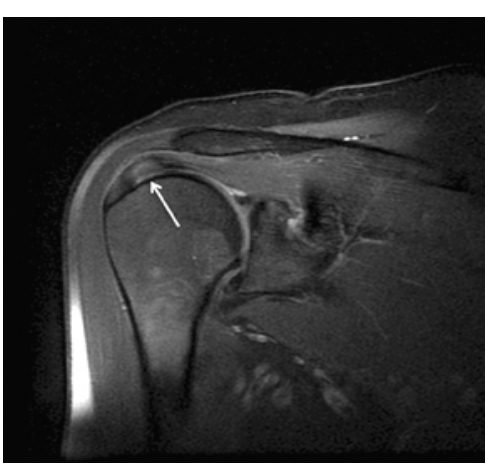
A.



B.

A.UGS shows partial thickness tear of the supraspinatus at its bursal surface. B.MRI STIR shows hyperintense signal at the bursal surface suggestive of partial thickness tear. Joint effusion is also noted.

A.

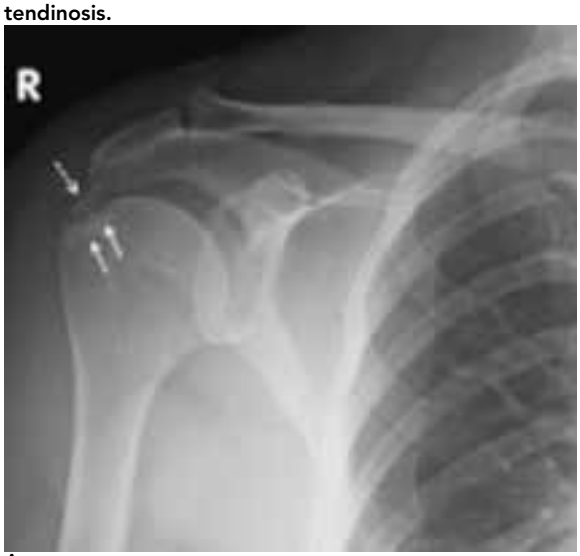


B.

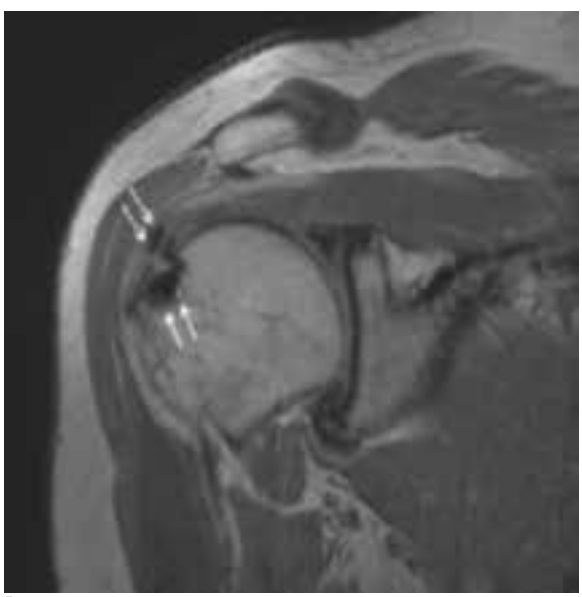
A.USG show linear hyperechoec areas within the the supraspinatus tendon, suggestive of the tendinosis. B. MRI STIR coronal image shows hypeintense signal in the tendon of the supraspinatus, suggestive of changes of

Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

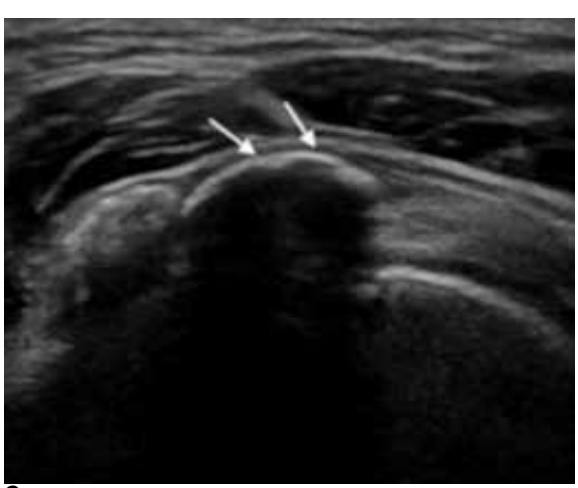
tendinosis.



A



B



C.

A. AP radiograph shows calcific density at the insertion of the supraspinatus tendon. B. MRI T1W Image shows hypointensity at the insertion of the supraspinatus tendon. C. USG shows calcification in the supraspinatus tendon

Discussion-

Various techniques are used for evaluating patients with shoulder pain, including clinical examination, X-ray, arthrography, USG, CT scan and MRI. The most accurate is MR arthrography. Conventional MRI is sensitive and specific, but cannot be used as a first line of investigation. However, USG is a non-invasive, interactive, relatively inexpensive modality that can be used.

MRI findings were classified as partial-thickness tear, full thickness tear and intact rotator cuff. By using established criteria for diagnosis of pathologies of rotator cuff as partial thickness of full thickness rotator cuff tear include: visualization of complete defect in tendon, extending from articular to the bursal surface of the tendon with presence of fluid signal and retraction of the musculotendinous junction.

Secondary signs include diffuse loss of the peribursal fat and fluid in subdeltoid bursa, fluid in gleno-humeral joint, muscle atrophy.

MRI findings for partial thickness tear of rotator cuff include: focal area of mildly increased signal of PD and T2 weighted images extends to either bursal or articular surface or its within the tendon substance and contour irregularities of partial cuff fiber retraction. Free fluid may be present in subacromial-subdeltoid bursa if the tear located on bursal surface of in the gleno-humoral joint if tear is present at articular surface.

Results-

This was a prospective study of 50 patients who presented with shoulder pain. A detailed history and clinical examination was done initially, following which an X-ray (AP) of the affected shoulder was done. An USG examination of the affected shoulder with comparison to the opposite side was done. These findings were correlated with MRI.

In our study, positive X-ray findings were seen in 11 (22%) patients and the rest of the 39 patients had normal X-ray findings. Cystic changes in the tuberosities of the humeral head were present in 5 (10%) patients in our study, erosions of the humeral head was present in only one case (2%), acromio-clavicular joint lesions were present in 8 (16%) of our patients, degenerative changes in the humeral head were present in 5 (10%) of the patients in our study, calcification of the rotator cuff tendon was present in 1 (2%), but none had degenerative changes of the glenoid.

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. Where in USG detected 36 (72%) patients and MRI detected 39 (76 %) patients with supraspinatus tendon pathologies. This is comparable to the study by Zlatkin et al where in they found that supraspinatus tendon involvement was present in around 70% of their cases.[6]

The sensitivity and specificity analysis of USG against MRI (Gold Standard)-The sensitivity, specificity and accuracy of USG against the MRI for Partial thickness finding is 100.0%, 91.8% and 92.0% respectively. The sensitivity, specificity and accuracy of USG against the MRI for Full thickness finding are NA, 95.0% and 96.0% respectively.

Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Seven patients had rotator cuff tendon calcification on X-ray/ultrasound, whereas MRI picked up only 1 case of calcification.

Impingement was found in 1 patient in our study on dynamic examination. MRI is not useful in impingement syndrome, as real time dynamic study cannot be carried out.

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. J Nørregaard, M R Krogsgaard, T Lorenzen, E M Jensen. Diagnosing patients with longstanding shoulder joint pain. Ann Rheum Dis 2002; 61:646–649.
3. Arun Kinare. Musculoskeletal Ultrasound Symposium. Indian J Radiol and Imaging 2007; 17(3):194-200.
4. Joseph O. de Jesus, Laurence Parker, Andrea J. Frangos, Levon N. Nazarian. Accuracy of MRI, MR Arthrography, and Ultrasound in the Diagnosis of Rotator Cuff Tears: A Meta-Analysis. AJR 2009; 192:1701–1707.
5. Alan D. Massengill, Leanne L. Seege, Lawrence Yao, Amilcare Gentili, Ronald C. Shnier, Matthew S. Shapiro, Richard H. Gold. Labrocapsular ligamentous complex of the shoulder: Normal Anatomy, Anatomic Variation and Pitfalls of MR Imaging and MR Arthrography. Radiographics 1994; 14: 1211-1223.
6. Zlatkin MB. Rotator cuff tears, diagnostic performance of MRI. Radiology 1989; 172: 223-229.