Research Article

Comparison of sensitivity and specificity of ultrasound scan and magnetic resonance imaging in diagnosing full thickness and partial thickness rotator cuff tear diagnosed by clinical examination in patients with shoulder trauma

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Abstract

Introduction: The shoulder joint stability is given predominantly by soft tissue structures. Correspondingly, correct diagnosis and treatment of diseases of the soft tissue structures around the glenohumeral joint are of major importance. The rotator cuff is composed of the musculo-tendinous parts of the subscapularis, supraspinatus, infraspinatus and teres minor muscles, which are affected with different frequencies by degeneration and trauma. **Aim and Objectives:** Find sensitivity and specificity of ultrasound scan and MRI in complete and partial thickness rotator cuff tears diagnosed clinically in patients with history of trauma. **Materials and Methods:** 41 Shoulder injury patients were analysed from September-2012 TO July 2014 in OPD and in patient of Father Muller Medical College with history of trauma examined clinically with various tests mentioned above to arrive at a clinical diagnosis and subjected to ultrasound and MRI examination to confirm diagnosis. **Results:** Complete tears were noted in 6 patients out of 6 patients in both ultrasound and MRI scanning. Incomplete or partial tears were picked up in 26 out of 35 patients by ultrasound scanning. MRI scan picked up partial or incomplete tear in 32 out of 35 patients. **Conclusion:** BEST non invasive investigation of choice to confirm the diagnosis is MRI in full thickness and especially in partial thickness rotator cuff tear with sensitivity of 100% and specificity of 96.3%, KAPPA statistics value of 0.936. Where ultrasound scan lacks in sensitivity. Next best alternative non invasive investigation is ultrasound scanning which is usually widely available, less cost, non invasive it has become one of the better methods of diagnosing rotator cuff injuries.
Keywords: US,MRI, Shoulder.

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INTRODUCTION

The shoulder joint stability is given predominantly by soft tissue structures. Correspondingly, correct diagnosis and treatment of diseases of the soft tissue structures around the glenohumeral joint are of major importance. The rotator cuff is composed of the musculo-tendinous parts of the subscapularis, supraspinatus, infraspinatus and teres minor muscles, which are affected with different frequencies by degeneration and trauma. There are findings on diagnostic images, which indicate a certain etiology of rotator cuff disease, In individual cases, however, an etiologic differentiation might be difficult and most important for the assessment of different

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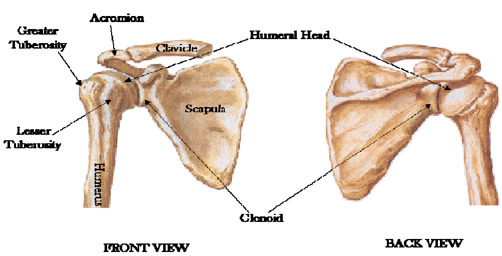
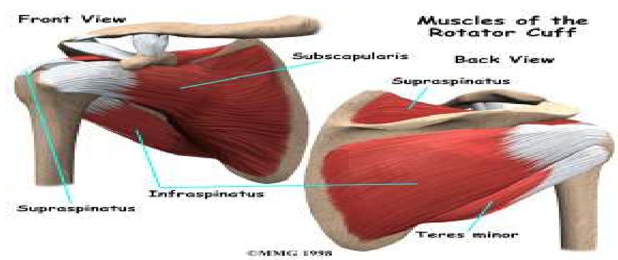
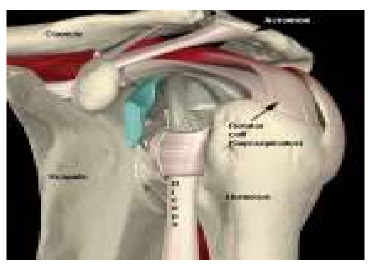
imaging modalities is their ability to detect combined pathologies of the shoulder joint.

Anatomy of the rotator cuff

The rotator cuff forms a reinforcement of the fibrous shoulder joint capsule except at its inferior portion. Anteriorly the subscapularis tendon inserts at the minor humeral tubercle and blends with the transverse humeral ligament, which passes over the intertubercular groove. Superiorly the supraspinatus tendon is the part of the rotator cuff most often affected by degenerative and traumatic tears or inflammation around its tendinous insertion at the greater tuberosity. More posteri-orly at the middle and lower third of the greater tuberosity there are the tendinous insertions of the infraspinatus and teres minor muscles. The rotator interval is a relatively week portion of the cuff located anteriorly between the supraspinatus and subscapularis tendons, where the long tendon of the biceps brachii muscle penetrates the rotator cuff and passes into the intertubercular groove. Biomechanically the rotator cuff functions as a dynamic stabiliser of the glenohumeral joint and retain the humeral head from the coracoacromial arch during abduction and elevation. The coracoacromial arch consists in the coracoid process, the coracoacromial ligament and the acromion. The subacromial-subdeltoid bursa is interposed between the rotator cuff and the coracoacromial arch and allows gliding of these two structures. Most remarkable as regards to the etiology of rotator cuff disease, however, is the intimate relationship of the supraspinatus tendon to the acromion, the acromioclavicular joint and the coracoacromial ligament and to a lesser degree the relationship of the subscapularis tendon to the coracoid process.







Normal range of movements at shoulder joint

1. Abduction: I80 degrees.
2. Adduction: 45 degrees.
3. Flexion: 170 degrees.
4. Extension: 45 degrees
5. Internal rotation: 80 degrees.
6. Exteranal rotation: 90 degrees.

Etiology of rotator cuff lesions

Traumatic lesions of the shoulder joint due to fall, road traffic accidents, sudden lifting of heavy weights which cause sudden jerky movements in shoulder along with anterior dislocation with or without fractures of the greater tuberosity or avulsion fractures of the major tubercle, are also frequently associated with rotator cuff tears. Another explanation of lesions of the rotator cuff tear is the assumption of degenerative changes at a so called critical zone close by the humeral cuff insertion, supposedly related to a diminished vascularisation. Other factors in rotator cuff tear are overuse and contractile overload. In conclusion there are multiple etiologic factors in rotator cuff tear being influenced by the age of the patients and their occupational and sports activities.

Acute tears causes

- Sudden powerful raising of the arm against resistance, often in an attempt to cushion a fall (examples: a fall on the shoulder)
- Sudden lift of heavy weight
- Injury usually associated with a significant amount of force.

Symptoms

- Sudden tearing sensation followed by severe pain shooting through the arm
- Motion limited by pain and muscle spasm

- Acute pain from bleeding and muscle spasm (often goes away in a few days)
- Point tenderness over the site of rupture
- With large tears, inability to raise the arm out to the side, although this can be done with help

Chronic tears

- Found among people in occupations requiring excessive overhead activity (examples: painters, baseball pitchers)
- Variations in the shoulder structure causing narrowing under the outer edge of the collarbone
- Occur more often in a person's dominant arm
- More commonly found among men older than 40 years
- Pain usually worse at night and interferes with sleep
- Worsening pain followed by gradual weakness
- Decrease in ability to move the arm, especially out to the side
- Able to use arm for most activities but unable to use the injured arm for activities that entail lifting the arm as high or higher than the shoulder to the front or side

CLASSIFICATION OF ROTATOR CUFF LESIONS

A-Synder classification

Surface of Tear
A: articular surface
B: bursal surface
C: complete
Severity of Tear
0: normal
1: superficial synovial or bursal irritation with mild capsular fraying
2: <2cms tearing of tendons
3: 2-3cms tearing of tendon
4: >3cms tearing with severe fraying and fragmentations

Location of tear

- supraspinatus tendon
- infraspinatus tendon
- rotator interval
- subscapularis tendon

B-Bosworth classification

1. incomplete tear
2. complete rupture

- pure transverse rupture
- pure vertical/longitudinal tears
- tears with retraction of tendon edges
- massive cuff avulsions

Complete Tear: Those tear which communicate between the bursa and joint.

Incomplete Tear: Those tear with no communication.

C-Cofield *et al* classification of complete tear

- small : < 1cm
- medium : 1 – 3cm
- large : 3 – 5cm
- massive : > 5cm

D-Ellman classification of incomplete tear

- GR1-<3mm
- GR2-3-6mm
- GR3->6mm

Clinical examination and various tests

Shoulder inspection

- Visualize from front and back
- Asymmetry
- Patients with rotator cuff tears hold shoulder higher
- Atrophy
- Sign of chronic glenohumeral joint pathology
- Effusions
- Shoulder joint can hide a lot of fluid

Palpation

- Along clavicle
- SC and AC joints
- Acromion, subacromial region
- Coracoid process (short head of biceps)
- Bicipital groove (long head of biceps)
- Trigger points in neck, trapezius, scapular region

JOBE TEST

Jobe described the “supraspinatus test” in 1983. The test is performed by placing the shoulder in 90 degrees of abduction and 30 degrees of forward flexion and internally rotated so that the thumb is pointing toward the floor. Muscle testing against resistance shows weakness or insufficiency of the supraspinatus owing to a tear or pain associated with rotator cuff impingement. Next, with the patient's arms at the sides, the patient flexes both elbows to 90 degrees while the examiner provides resistance against external rotation. This maneuver is used to evaluate the function of the infraspinatus and teres minor muscles, which are mainly responsible for external rotation.

Lift-off test

The lift-off test for detection of an isolated rupture of the subscapularis tendon. With the patient seated or standing, the arm is internally rotated, and the dorsum of the hand is placed against the lower back. If the patient is unable to lift the dorsum of the hand off the back, the test is positive.

Belly press test

Gerber *et al*. described the belly press test for patients who have decreased internal rotation. In this test, the patient presses the abdomen with the flat of the hand and attempts to keep the arm in maximal internal rotation.. If the strength of the subscapularis is impaired, maximal internal rotation cannot be maintained, the patient feels weakness, and the elbow drops back behind the trunk. The patient exerts pressure on the abdomen by extending the shoulder, rather than by internally rotating it. When the subscapularis tendon is torn, patients tend to flex the wrist to press against the abdomen and are unable to hold the elbow forward

Drop-arm test

A possible rotator cuff tear can be evaluated with the drop-arm test. This test is performed by passively abducting the patient's shoulder, then observing as the patient slowly lowers the arm to the waist. Often, the arm will drop to the side if the patient has a rotator cuff tear or supraspinatus dysfunction. The patient may be able to lower the arm slowly to 90 degrees (because this is a function mostly of the deltoid muscle) but will be unable to continue the maneuver as far as the waist.

Neer impingement sign and impingement test

With the patient seated, the examiner raises the affected arm in forced forward elevation while stabilizing the scapula, causing the greater tuberosity to impinge against the acromion. This maneuver produces pain with impingement lesions of all stages.

Hawkin'kennedy test

The test is performed by forward flexing the humerus to 90 degrees and forcibly internally rotating the shoulder. This maneuver drives the greater tuberosity farther under the coracoacromial ligament, reproducing the impingement pain

Gerber subcoracoid impingement test

The arm is forward flexed 90 degrees and adducted 10 to 20 degrees across the body to bring the lesser tuberosity into contact with the coracoids and internally rotated. Pain with the maneuver indicates coracoid impingement.

Speed test

The Speed test is performed by having the patient forward flex the shoulder to 90 degrees with the elbow extended and the forearm supinated. Resistance is applied to the forearm, and a positive result produces pain localized to the bicipital groove.

Yergasons Sign

The elbow is flexed to 90 degrees, and the forearm is pronated. The patient attempts to supinate the forearm actively against resistance applied by the examiner at the patient's wrist. Pain localized to the bicipital groove indicates inflammation of the long head of the biceps.

Cross-arm test

Patients with acromioclavicular joint dysfunction. The patient raises the affected arm to 90 degrees. Active adduction of the arm forces the acromion into the distal end of the clavicle. Pain in the area of the acromioclavicular joint suggests a disorder in this region.

Instability Testing

The tests described in this section are useful in evaluating for glenohumeral joint stability. Un involved extremity is examined for comparison with the affected side.

Apprehension Test

The anterior apprehension test is performed with the patient supine or seated and the shoulder in a neutral position at 90 degrees of abduction. The examiner applies slight anterior pressure to the humerus (too much force can dislocate the humerus) and externally rotates the arm. Pain or apprehension about the feeling of impending subluxation or dislocation indicates anterior glenohumeral instability.

Relocation Test

The relocation test is performed immediately after a positive result on the anterior apprehension test. With the patient supine, the examiner applies posterior force on the proximal humerus while externally rotating the patient's arm. A decrease in pain or apprehension suggests anterior glenohumeral instability.

Sulcus Sign

With the patient's arm in a neutral position, the examiner pulls downward on the elbow or wrist while observing the shoulder area for a sulcus or depression lateral or inferior to the acromion. The presence of a depression indicates inferior translation of the humerus and suggests inferior glenohumeral instability.

Posterior Apprehension and Instability

With the patient supine or sitting, the examiner pushes posteriorly on the humeral head with the patient's arm in 90 degrees of abduction and the elbow in 90 degrees of flexion.

'clunk' sign:

Glenoid labral tears are assessed with the patient supine. The patient's arm is rotated and loaded (force applied) from extension through to forward flexion. A "clunk" sound or clicking sensation can indicate a labral tear even without instability.

Cervical Disc Disease

No physical examination in a patient with shoulder pain is complete without excluding cervical spine disease. Referred or radicular pain from disc disease The patient should be questioned about neck pain and previous neck injury, and pain worsens with turning of the neck, which suggests disc disease.

Spurling's Test

The patient's cervical spine is placed in extension and the head rotated toward the affected shoulder. An axial load is then placed on the spine. Reproduction of the patient's shoulder or arm pain indicates possible cervical nerve root compression.

INVESTIGATIONS

Plain X-Ray of shoulder

The routine shoulder trauma series consists of an anteroposterior (AP) view with medial to lateral (30- 45 °) and cranial to caudal (20 °) angulation completed by the scapular Y view. These two X-rays, which are perpendicular to each other, enable the diagnosis of fractures. Rotator cuff injuries are not detectable directly on conventional X-rays, but may be assumed in certain osseous lesions and depending on the mechanism of the trauma when the humeral head is riding high and possibly even a arthrosis with the acromial undersurface has developed The cranial to caudal angulation of the AP view facilitates the assessment of the acromial undersurface for Subacromial spurs or osteophytes. Series consist of AP views in internal and external rotation with cranial to caudal angulation (20 °) and an AP view the arm hold in abduction. On these images calcifications of the rotator cuff, Subacromial osteophytes and fibroostotic alterations are detectable.

Ultrasound

The ultrasound examination of the shoulder seems to be very attractive, because it is a quiet simple, non-invasive, frequently available and relatively inexpensive technique. However, the reported sensitivity and specificity of ultrasound studies of the rotator cuff vary between 57-91% and 76-100%, respectively noted in various studies conducted. There are some requirements for high quality ultrasound studies, particularly a linear transducer with2-12 MHz. The examination procedure has to be standardized comprising the visualization of all cuff tendons and the long biceps tendon in a transverse and longitudinal plane, The comparison with the opposite side is advisable and to avoid misleading artifacts. perpendicular positioning of the transducer with regard to the tendon structures is of extreme importance. Disadvantages of ultrasound is lack of visualisation of posterior aspect of supraspinatus and infraspinatus tendons and limited view of glenohumaral joint. However most rotator cuff leasions involve the “critical zone” in anterior aspects of tendons so ultrasound scanning is useful. Results of imaging technique will also depends on the skill of examiner.

Figure 1: Full thickness rotator cuff tear

Figure 2: Partial thickness rotator cuff tear

Magnetic resonance imaging

This imaging modality is effective in demonstrating both the soft tissue and bony abnormalities associated with structuralshoulder impingement which include

- subacromial-subdeltoid bursitis
- supraspinatus tendinopathy
- rotator cuff tendon tears
- subacromial osteophytic spurs
- acromioclavicular joint capsular hypertrophy and osteophytosis
- The detection of a subacromial osteophytic spur is considered specific for shoulder impingement syndrome.

The 3 most accurate magnetic resonance imaging signs of a full thickness supraspinatus tendon tear reported are:

- Tendon discontinuity,
- Musculotendinous junction retraction and supraspinatus tendon thinning
- Fluid signal in the rotator cuff tendon indicates a tear; partial is distinguished from full-thickness by depth of fluid signal.
- Fatty atrophy of rotator cuff muscles is seen as increased signal on T1-weighted images.
- Biceps tendon subluxation or dislocation is well visualized on axial views; tendon splits or complete tears are detected in 3 planes (axial, coronal, sagittal).
- Glenoid labral tears are identified by abnormal morphology and fluid dissecting deep to or within the labrum; paralabral cysts may be located in the suprascapular or spinoglenoid notch.
- Acromial shape (flat, curved, hooked) and subacromial spurs are detected on sagittal oblique views

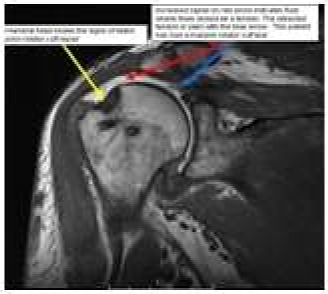


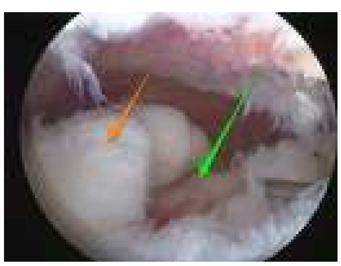
Figure 3: Full thickness rotator cuff tear

Invasive methods

MR arthrography

MR arthrography was introduced to overcome the limitations of MR imaging in diagnosing rotator cuff disease and shoulder instability. It can be done with different fluids, such as pure saline and ringer lactate, or with a mixture of saline and gadolinium contrast media. In comparison with unenhanced MR imaging, MR arthrography tended to improve the differentiation and detection especially of partial rotator cuff tears and showed better results for the evaluation of labral tears as well. MR arthrography enables the delineation of subtle anatomical details and makes the diagnoses of rotator cuff diseases and labro-ligamentous lesions more reliable. Furthermore, fat-saturation techniques are an important addition to MR arthrography in order to differentiate the subacromial-subdeltoidal fat plane from a contrast leakage due to a complete rotator cuff tear These techniques therefore improve the detection of partial thickness tears and are helpful to avoid false positive diagnoses of complete rotator cuff tears.

Diagnostic arthroscopic examination



AIM

Find sensitivity and specificity of ultrasound scan and MRI in complete and partial thickness rotator cuff tears diagnosed clinically in patients with history of trauma.

Analysis of data

Than clinical diagnosis is correlated with ultrasound and MRI diagnosis, compared and analyzed for sensitivity, specificity, positive predictive value, negative predictive value, P-Value KAPPA value using KAPPA statistics. And final conclusions are made.

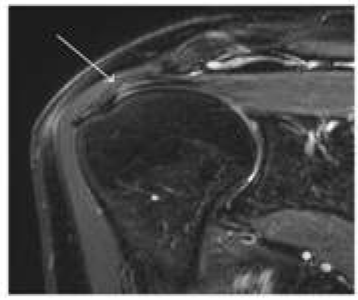


Figure 4: Partial thickness tears as shown by arrow

METERIALS AND METHODS

41 Shoulder injury patients were analysed from **September-2012 TO July 2014** in OPD and in patient of father muller medical college with history of trauma examined clinically with various tests mentioned above to arrive at a clinical diagnosis and subjected to ultrasound and MRI examination to confirm diagnosis. X-ray examination of shoulder joint were done in all patients to rule out bone fractures, osteoarthritis, any bone pathology and inflammatory arthritis.

Inclusion criteria

Men and women aged > 18 yrs and above with shoulder pain due to trauma irrespective of any systemic diseases.

Exclusion criteria

1. Fractures and dislocations.
2. Diagnosed neoplastic conditions.
3. Immune compromised conditions.
4. Infective conditions.
5. Previous shoulder joint surgery.

The ethical committee of our hospital approved the present study, and verbal consent was obtained from all patients participating in the study.

Ultrasound imaging

Radiologist using a high-resolution Philips IU-22 Machine with linear-array transducer with variable high frequency (5-12 MHz) probe scanned all the patients. The sonographic evaluation of the rotator cuff was performed according to a standard protocol. The depth of the ultrasound beam was adjusted to accommodate for differences in soft-tissue mass among the patients. The ultrasound examinations were performed with the patient seated on a backless stool and the examiner standing erect behind the patient. By positioning the transducer around the curvature of the humeral head in the oblique transverse plane, the biceps was viewed in its osseous groove. Once located, the biceps could be followed longitudinally, parallel to its fibers. Dynamic images of the subscapularis tendon were recorded while the patient actively rotated the shoulder from internal to external rotation. The transducer was oriented transverse to the arm to allow the longitudinal extent of the subscapularis tendon to be seen as the tendon inserts on the lesser tuberosity. The subscapularis tendon was viewed longitudinally, parallel to its primary fiber orientation. On transverse images, the individual tendon slips were seen. Dynamic assessment of subacromial (anterosuperior) impingement was recorded by placing the transducer in the coronal plane with its medial margin at the lateral margin of the acromion. During dynamic assessment, the patient abducted the arm while in internal rotation. Supraspinatus tendon was examined with the patient's arm placed posteriorly, placing the palmar side on the superior aspect of the iliac wing with the elbow flexedand directed posteriorly. The transducer was placed anterior to the acromioclavicular joint and oriented 458 to demonstrate the longitudinal course of the tendon, and was then rotated 908 to demonstrate the transverse plane of the tendon. The infraspinatus tendon was viewed longitudinally with the hand on the opposite shoulder, and the transducer was Positioned just inferior and parallel to the spine of the scapula. The infraspinatus muscle was then followed laterally as it crossed the posterior glenohumeral joint and became the tendon. Partial-thickness tears were diagnosed when there was a focal hypoechoic or anechoic defect in the tendon, involving either the bursal or the articular surface and manifested in two perpendicular planes. The size of the tear was measured in millimetres directly on freeze-frame images with use of the cursor software function. Other findings that were noted included excessive fluid in the Subacromial Subdeltoid (SASD) bursa, in homogeneity of the tendinous substance, synovial thickening or fibrosis of the bursal wall, and calcification flecks. The most prominent dynamic sign of subacromial impingement was considered the ''bunching'' of the SASD bursa on the lateral acromial margin during shoulder abduction.Than patient subjected to MRI scanning of the affected shoulder.

RESULTS

Complete tears were noted in 6 patient out of 6 patients in both ultrasound and MRI scanning

Age range: 43-83 years

Table 1: Age Distribution

Age (yrs)	Nos.	Percentage (%)
<40trs	0	0
41-50	3	50
51-60	0	0
>60yrs	3	50
Total	**6**	**100**

6 patients (2 male 4 female) with age ranging from 43 to 83 years with history of trauma.

Table 2: Side distribution

Side	Right	Left
	3	3

3 dominant hand and 3 non dominant hand

Table 3: Sex distribution

Gender	Nos.	Percentage
Male	2	33.34
Female	4	66.66
Total	**6**	**100**

2- Male, 4-Female patients.

Table 4:

	No's		No's		No's
Clinically Positive	6	Ultrasound and MRI Positive	06	Ultrasound and MRI negative	0
Clinically Negative	35	Ultrasound and MRI Positive	00	Ultrasound and MRI negative	35

KAPPA STATISTICS OF BOTH MRI AND ULTRASOUND

Sensitivity of 100%
Specificity of 100%
Positive predictive value [PPV] of 100%
Negative predictive value of 100%
Kappa -1
P-Value-<0.01

2A: **Incomplete or partial tears were picked up in 26 out of 35 patients by ultrasound scanning.**
2B: MRI scan picked up partial or incomplete tear in 32 out of 35 patients.

Age range-21-70 years

Table 5: Age distribution

Age (yrs)	No's	Percentage (%)
<40trs	11	31.42
41-50	8	22.85
51-60	8	22.85
>60yrs	8	22.85
Total	**35**	**100**

35 patients (26 male 9 female) with age ranging from 21 to 70 years with history of trauma.

Table 6: Side distribution

Side	Right	Left
	24	11

24 dominant hand and 11 non dominant hand

Table 7: Sex distribution

Gender	Nos.	Percentage %
Male	26	78.28
Female	9	25.72
Total	**35**	**100**

26- Male, 9-Female patients

Table 8:

	No's		No's		No's
Clinically positive	35	Ultrasound Positive	26	ultrasound negative	9
Clinically negative	6	Ultrasound Positive	00	ultrasound negative	6

KAPPA STATISTICS OF ULTRASOUND SCAN

Sensitivity of 73.3%
Specificity of 100%

Positive predictive value [PPV] of 100%
Negative predictive value of 40%
Kappa –O.458
P-Value-<0.001

KAPPA STATISTICTS OF MRI
Sensitivity of 100%
Specificity of 96.3%
Positive predictive value [PPV] of 91.4%
Negative predictive value of 40%
Kappa –O.936
P-Value-<0.001
The 3 negative patients {1 female 2 male} where MRI scan showed negative for partial or incomplete tear. Arthroscopy was done and diagnosis of partial tear was confirmed.

DISCUSSION

A number of studies have been carried out since 1995, in order to compare US and MRI in detecting partial tears and complete tear of the rotator cuff, with correlation to surgical findings. The results of these studies are controversial and, although a consistent improvement in detection rates has occurred with advancement in imaging techniques, use of higher end machines with high end probes frequency ranging between(5-13 MHz). Our data says that ultrasound and MRI are very good diagnosing tool in diagnosing full thickness rotator cuff tears. But MRI is more sensitive in diagnosing partial thickness tears compared to ultrasound as shown in our study. Invasive methods are like MR-Arthrography and Diagnostic Arthroscopy are the best investigations to diagnose all kinds of rotator cuff tears. But due its limited availability, high cost of procedure, skilled man power, complications and technical expertise to do it, its usage is limited in clinical practice. Clinical examination is considered essential for classification of subgroups of patients with shoulder pathology. Identification of tears as partial and correct localization (articular or bursal) are of great importance for the treating surgeons. Exact localization aids decision-making regarding the procedure (arthroscopic or mini-open), since only arthroscopy allows intraarticular visualization of the rotator cuff structures. Dimensions of the partial tear have relatively less importance since great retraction of partial lesions is not expected. The most useful information that the surgeon would seek from an imaging modality regarding partial tears is the depth of the lesion, since significant lesions (50% thickness) necessitate repair

CONCLUSSION

Rotator cuff tear is most common noted pathology in shoulder following injury due to trauma where patient has painful and limited range of motion especially abduction and internal rotation movements along with clinical examination **BEST non invasive investigation of choice to confirm the diagnosis is MRI in full thickness and especially in partial thickness rotator cuff tear with sensitivity of 100% and specificity of 96.3%, KAPPA statistics value of 0.936. Where ultrasound scan lacks in sensitivity.** Next best alternative non invasive investigation is ultrasound scanning which is usually widely available, less cost, non invasive it has become one of the better methods of diagnosing rotator cuff injuries. Ultrasound has an established role in detecting shoulder pathology, particularly full thickness rotator cuff tears with almost Sensitivity of 100% and Specificity of 100%. In partial thickness tear its Sensitivity of 73.3% and Specificity of 100% with KAPPA statistics value of 0.458 which says it is a good diagnostic tool to detect partial tears also if modern machines with probes frequency ranging between 5-12 MHz are used by an experienced radiologist and proper protocol is followed while examining the patient.

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