ORIGINAL ARTICLE

Indirect Magnetic Resonance Arthrography in Detection of Rotator Cuff Tears

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ABSTRACT

Aim: To determine the frequency of diagnosis of rotator cuff tears using indirect magnetic resonance arthrography in clinically suspected patients.
Methods: This cross-sectional survey was conducted at Department of Diagnostic Radiology, Lahore General Hospital, Lahore from 12-01-2009 to 11-07-2009. Total 55 patients having rotator cuff tear on the basis of history of present illness (shoulder pain and dislocation), past history and history of trauma were included.
Results: Majority of the patients 25 (45.4%) were more than 60 years with mean age of 62.9±7.4. 35 patients (63.6%) had pain while limitation of movement developed in 15 patients (27.2%). Rotator cuff tears were found in 36 patients (65.4%), full thickness tear of rotator cuff tendon in 21 patients (38.1%) and partial thickness tear of rotator cuff tendon in 17 patients (30.9%).
Conclusion: The indirect magnetic resonance arthrography is a noninvasive procedure that also enhances the joint cavity and offers logistical advantages.
Keywords: Rotator cuff tear, Magnetic resonance-, Trauma

INTRODUCTION

The rotator cuff is composed of intimately associated tendons of supraspinatus, infraspinatus, teres minor and suprascapularis that form a single functional unit[1]. Rotator cuff tears occur when movement of head of humerus crushes the rotator cuff tendons against the coracoacromial arch. This bony ligamentous arch is composed of coracoids, the acromian and the intervening coracoaromial ligament. Chronic repetitive micro trauma is claimed to cause inflammation of rotator cuff and overlying subacromial bursa which may ultimately progress to a partial or complete thickness rotator cuff tear[2].

The critical zone of the rotator cuff is particularly susceptible to this process. This relatively hypo vascular zone is in the anterior aspect of supraspinatous tendon within 2cm of its insertion to the humerus[1]. In general population the prevalence of rotator cuff disease seems to correlate with the aging process. Magnetic resonance imaging demonstrates partial or complete thickness tears of rotator cuff in 4% of the asymptomatic patients less than 40 years of age and 54% in those more than 60 years of age[3].

Radiographic examination may help in diagnosis of osteoarthritis of acroimioclavicular joint, os acromial and dislocation of glenohumeral joint and calcific tendinosis however direct visualization of the presence or absence of rotator cuff tear is not possible. Ultrasound is helpful in the diagnosis of rotator cuff tears but all rotator cuff tears are not diagnosed by it. MRI can show the presence of rotator cuff tears and subacromial bursa abnormalities. Still some tears are missed by conventional MR[4].

Direct intra articular injection of contrast material using guidance of ultrasound or fluoroseopy (direct magnetic resonance arthography) is more sensitive in the diagnosis of rotator cuff tears than conventional MR imaging. However this procedure is invasive. It has recently been shown that intravenous administration of gadopentate dimeglumine enhances the joint cavity and thus indirectly produces an arthographic effect. The indirect MR arthography detects 100% complete depth tears and 71.4% fractional width rotator cuff tears.[5]

The objective of the study was to determine the frequency of diagnosis of rotator cuff tears using in clinically suspected patients.

PATIENTS AND METHODS

This cross-sectional survey was conducted at Department of Diagnostic Radiology, Lahore General Hospital, Lahore from 12-01-2009 to 11-07-2009. Total 55 patients clinically suspected of having rotator cuff tear were included. Patients with age of 40-65 years and both sexes having signs of impingement syndrome for example shoulder pain and difficulty in movement for the duration of last one year, history of trauma and sports injury and previous history of

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dislocation were included. Those patients who were unable to keep their symptomatic arm in abduction and external rotation due to severe pain and post surgical patients having shoulder pain were excluded.

All MR examination was performed with a 1.5 Tesla unit. For indirect MR arthrography an intravenous injection of gadopentate dimeglumine (0.5 mmol/l) dose 0.1 mmol/Kg) with antecubital vein was done. The patient was advised to move the injured shoulder after injection (abduction and adduction). After 15 minutes, injection of gadopentate dimeglumine, the patient was placed in magnetic resonance unit. Patient was asked to position the hand of the exaggerated arm in the neutral position. T1 weighted and T2 weighted coronal oblique sequences, T1 and T2 weighted sagital oblique sequences were obtained. MR arthrographic findings including existence or nonexistence of rotator cuff tears & if tear is present then it was noted whether it is partial thickness and full thickness rotator cuff tear. SPSS version 16 was used for data analysis.

RESULTS

There were 37(67.3%) males and 18(32.7%) females with mean age were 62.9±7.4 (Table 1). Clinical indications showed pain in 35 patients (63.7%) while limitation of movement developed in 15 patients (27.3%). Asymptomatic cases were 5(9%) (Table 2).

Table 1: Demographic information of the patients

Variable	n	%age
Age (year)		
40-50	09	16.4
51-60	21	38.2
> 60	25	45.4
Sex		
Male	37	67.3
Female	18	32.7

Table 2: Distribution of cases by clinical indications

Clinical indications	n	%age
Pain	35	63.7
Limitation of movement	15	27.3
Asymptomatic	05	09.0

Table 3: Indirect MR arthrographic findings

Findings	n	%age
Full thickness tear of rotator cuff tendon	21	38.2
Partial thickness tear of rotator cuff tendon	15	27.3
Normal	19	34.5

The arthrographic findings, full thickness tear of rotator cuff tendon in 21 patients (38.2%) and partial thickness tear of rotator cuff tendon in 15 patients (27.3%) while normal patients (without cuff tears) were 19(34.5%) (Table 3).

DISCUSSION

In the injured athlete magnetic resonance imaging provides better soft tissue detail. On MR images glenohumeral ligaments, labrum, capsule, cartilage and rotator cuff can be better visualized. MRI will also display bone marrow and show a bone marrow contusion or the spectrum of strain injury, including early stress reaction in bone marrow or a stress fracture. If a contrast enhanced MRI is indicated it may be ordered as indirect or direct arthrography[6]. Classic rotator cuff-tear patients experience pain that is chronic in nature and present with or without activity[7].

The prevalence of rotator-cuff tear is more familiar in patients above 40 years and believed to be the result of repetitive stress in association with tendon degeneration. Rotator-cuff tear prevalence increases with age in asymptomatic and symptomatic patients.[8] Tears may be traumatic, due to single trauma or repetitive microtrauma, partial, degenerative as a result of structural change[9].

According to Webster[10] 61% of patients of rotator cuff-tear have pain. According to present study, pain was present in 63.6%. Moreover, 26% of patients complained of severe pain and limitation of movement. Diagnosis of full thickness tear was made if high signal intensity was seen involving entire thickness of tendon or there was tendon discontinuity with presence or absence of tendon retraction. According to Thomas et al[11] tears of rotator-cuff were present in 67%. These results are consistent with present study where rotator-cuff tears were present in 65.5%. 95% of full thickness tears and 71% of partial thickness tears can be diagnose by using indirect MR arthography in patient with neutral position[11].

CONCLUSION

Full thickness tear is easily diagnosed then partial thickness tear and radiographic examination including USG and plain MR imaging is less sensitive for its diagnosis. Anatomy of shoulder joint, all joint spaces and rotator cuff is better delineated using Indirect MR arthography. Sub-cromial, sub-deltoid bursa is always enhanced using indirect MR arthography. This is more helpful for bursal side partial thickness tear detection.

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