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19(1) 2024

Research

Tendon and ligament injuries of shoulder joint: new era of diagnosis and management

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Received: 12.1.2024;

Manuscript No. jotsrr-24-124992;

Editor assigned: 15.1.2024,

PreQC No. jotsrr-24-124992(PQ);

Reviewed: 22.1.2024, QC No. jotsrr-24-124992(Q);

Revised: 15.2.2024,

Manuscript No. jotsrr-24-124992(R);

Published: 25.3.2024,

DOI. 10.37532/1897-2276.2024.19 (1).85

Abstract

Background: MRI and ultrasound are now widely used for the detection of tendon and ligament abnormalities.

Purpose: Aim of study to evaluated the beneficial role of MRI in investigation and management of the tendon and ligament injuries of shoulder joint.

Methods: This study is cross-sectional study in Basrah Teaching Hospital of cases with shoulder pain aged ranged from 18-70 years, in the period from August 2022 to August 2023. Patients underwent a full history and physical examination with guide of questionnaire. 3.0-Tesla MRI (Philips, Netherland) was used.

Results: The mean age of patients was 45.7 ± 13.2 years. Right side shoulder affected by 72.5% and left side affected in 27.5% of patients. Regarding the finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45 patients had rotator cuff injury, 11(17.8%) patients with tendinopathy, 27 (43.6%) had partial tear and 11.2% with complete tear. More than half in supraspinatus muscle (51.2%), 24.4% in infraspinatus muscle, 20% in subscapular and 4.4% in teres minor muscle.

Conclusions: MRI have an supportive role in diagnoses grading and treatments arrangement of shoulder joint injuries. MRI is required in order to evaluate the joint in more detailed manner than other modalities. MRI findings most seen in older age group more than forty years. Rotator cuffs are effected more than other muscles in shoulder and supraspinatus is common site.

Keywords: Tendon and ligament injuries; Shoulder joint; Tendinopathy; MRI

INTRODUCTION

Shoulder joint injuries are common pathology. The frequent dislocation that happened in shoulder due to sole shoulder structure. In addition, there were various pattern of painful shoulder and variable causes, one of most common causes are shoulder impingement with many causative factors [1]. Previous studies reported 70% of patients with shoulder pain come from pathology in rotator cuff diseases that account the most common etiology for shoulder complain [2]. Variables rotator cuff tendons pathology may be due to tear, degeneration and inflammation. Many types of images modalities used to investigated the shoulder complain like ultrasound, radiographs, CT scan and the gold standard are MRI according to the American College of Radiology (ACR) in suitable characters for evaluation of traumatic and non traumatic shoulder pain in suspicion of rotator cuff pathology [3]. Meanwhile the radiographs can give initial useful picture about the disease and ultrasound can beneficial in detect the full thickness tear in assessment of shoulder, whereas the MRI provide the brilliant and wide range of image of soft tissue structure exactly the labrum and rotator cuff [4]. In certain situation the MR arthrography may be indicated in specific rotator cuff tear such as partial tear, tear in supraspinatus and articular side [5].

Indication for MRI in assessment of shoulder pathology are: Documentation of specific abnormal anatomy that related to cause of clinical syndrome of impingement; Detect and description of rotator cuff diseases; and Assessment of glenohumeral stability [6].

Aim of study to evaluated the beneficial role of MRI in investigation the tendon and ligament injuries of shoulder joint.

METHODOLOGY

A cross-sectional study enroll 60 patients with shoulder problems, started from August 2022 to August 2023 in Basrah Teaching Hospital.

INCLUSION CRITERIA

1. Patients had limiting in shoulder movement
2. Painful shoulder
3. Age >18 years

EXCLUSION CRITERIA

1. Pregnant women
2. Shoulder dislocation and neoplastic lesion
3. Patients had prior management for shoulder injuries
4. Osteoarthritis
5. Fractures
6. DM or hypertension.

DATA COLLECTION

Patients included in the study underwent a full history and physical examination with guide of questionnaire that consist of part for demographic characters, part of chief complaints and history of present illness and laboratory investigation and lastly image findings.

MRI INSTRUMENT

3.0-Tesla MRI (Philips, Ingenia 3T, Supercon, Netherland) was achieved on a high field system magnet unit. Standard parameter for work of MRI as following: field of views was 25 cm x 25 cm; scan thickness and gaps were 5 mm and 1.5 mm, respectively; and matrix were 257 x 257 or 513 x 513. Systematic scanning sequences were used, included fast spine cho (TSE) T2-weight image (T2WI) Short-Term Inversion Recovery Sequence (STIR) (among them, TR/TE were 5000/29 ms), and spine cho (SE) T1-weighted imaging (T1WI).

ETHICAL APPROVAL

The study was approved by Department of Radiology and a written consent was obtained from each patient before participating in the study.

STATISTICAL ANALYSIS

Data was collected and included in a data based system and analyzed by statistical package of social sciences (SPSS, Inc., Chicago, IL, USA) version 23. Parametric data were expressed as mean \pm Standard Deviation (SD). While non-parametric data were expressed as percentages.

RESULTS

The mean age of our study patients was 45.7 ± 13.2 and within range 18-70 years. Patients age below forty were constituted 43.6% and 56.4% above or equal forty years. The male were 58% and female 42%. Heavy work presented by 30.7% and 69.3% had history of light work. Right side shoulder affected by 72.5% and left side affected in 27.5% of patients (Table 1).

Table 1. Demographic characters

Variables	No.	%	
Age (mean \pm SD)	45.7 \pm 13.2		
Gender	Male	36	58
	Female	26	42
Occupation	Heavy work	19	30.7
	Light work	43	69.3
Side	Right	45	72.5

	Left	17	27.5
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(Table 2) reveal presenting features and complain criteria of patients, 45.2% of patients complain from pain, 22.5% with stiffness, both of pain and stiffness in 17.8%, 9.7% come with difficult in raising the arm and numbness seen in 4.8%. Regarding the finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45 patients had rotator cuff injury, 11(17.8%) patients with tendinopathy, 27 (43.6%) had partial tear and 11.2% with complete tear (Table 3).

Table 2. The clinical features of patients

Features	No.	%
Pain	28	45.2
Stiffness	14	22.5
Pain and stiffness	11	17.8
Difficulty in raising the arm	6	9.7
Numbness	3	4.8

Table 3. MRI findings for patients

Finding		No.	%
Normal		13	20.9
Rotator cuff pathology	Tendinopathy	11	17.8
	Partial tear	27	43.6
	Complete tear	7	11.2
Biceps tenosynovitis		4	6.5

Table 4 show site of rotator cuff lesion, more than half in supraspinatus muscle (51.2%), 24.4% in infraspinatus muscle, 20% in subscapular and 4.4% in teres minor muscle (Table 4).

Table 4. Site of rotator cuff muscle lesion.

Site of rotator cuff tear	No.	%
Supraspinatus muscle	23	51.2
Infraspinatus muscle	11	24.4
Subscapular muscle	9	20
Teres minor tendon	2	4.4

DISCUSSION

The great joint in the body had highly freedom and motion was the shoulder joint. Therefore it has large chance of instability and subject to damage. Pain is a common presentation for shoulder joint [7].

Imaging plays an important role in the assessment of post traumatic shoulder disorders includes ultrasono-graphy and conventional magnetic resonance [8].

Images modalities by MRI become helpful instrument for assessment of muscle and skeletal in general with special surface coil. Therefore MRI pictures of shoulder has many benefit in comparison to traditional methods. The shoulder

joints are surrounding by soft tissue for support so need multiple plane study to evaluated, the MRI give multiplanar imaging it superior to CT scan image [9].

Investigation modalities by MRI obviously show rotator cuff tendons and muscles, this aid in diagnosis any abnormal finding and could be precise quantified the location of tear [10].

Patients age below forty were constituted 43.6% and 56.4% above or equal forty years. The male were 58% and female 42%. It consistent with study by Koganti et al [11].

Wengert G], study of sixty seven patients male was 47 and 20 female age range from 18-70 years, with mean age 39.5 years [12].

Mamoun et al study included patients with age range (20 – 60 years) and 60% of sample were male [13]. Other authors enrolled fifty patients, with age range from 19 to 67 years (mean age 43 years) [14].

Islam El-Hefnawi reported 64% of samples were female and male 36% of total sample, mean age 45 years and age range 25-65 years [1].

Other author reported 64 male and 48 female, age range from 20-72 year and with mean age 50.2 ± 9.8 years [15].

Our study differed from study by Yu et al, who reported female predominance 58.3% with no significant difference in age (average age was 49.5 years) [16].

A study by Koganti et al, they study 50 patients with rotator cuff disease 52% were males and 48% were females, with no significant difference among group regarding gender [11].

Our patients mostly presented with right side shoulder affected by 72.5% and left side affected. It in line with prior study Mamoun et al [13].

Islam El-Hefnawi reported right side was the more affected side in 34 patients and left side in 16 patients [1]. Also Xingzhen Hu study 29 left side shoulder and 71 right side [15]. Our patients were revealed presenting features and complain criteria, 45.2% of patients complain from pain, 22.5% with stiffness, both of pain and stiffness in 17.8%, 9.7% come with difficult in raising the arm and numbness seen in 4.8%. It is consist with Mamoun et al [13] and El-Hefnawi [1].

Koganti et al, studied patients, they reported 40% of patients frequent complain from pain alone, 20% of them complain from stiffness in joint, 18% of patients had both combination pain and stiffness, 14% show difficult in arm raising and numbness presented in two patients only which consider less common symptoms [11].

Xingzhen Hu reported more frequent complain in 110 patients in his study are pain and limitation of shoulder movement [15].

Regarding our finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45

patients had rotator cuff injury 11(17.8%) patients with tendinopathy, 27 (43.6%) had partial tear and 11.2% with complete tear show site of rotator cuff lesion, more than half in supraspinatus muscle (51.2%), 24.4% in infraspinatus muscle, 20% in subscapular and 4.4% in teres minor muscle. It agree with study El-Hefnawi et al [1].

A study presented pathology of shoulder muscle in 112 patients, supraspinatus tendon abnormal presentation seen in 97 patients while subscapularis tendon in 6 patients show abnormal appearance in addition, only two patients with abnormal morphology of teres minor tendon whereas infraspinatus tendon abnormal pathology in seven patients [15].

Islam El-Hefnawi reveal 20% with complete tear and partial tear in 28%, biceps tenosynovitis was seen in 32% [1].

Other authors stated tendons of supraspinatus were mostly affected followed by other tendon of rotator cuff subscapularis and infraspinatus. While teres minor not found in their study patient. and 54% presented with partial tear [1], which is agreement of study by of Koganti et al, the supraspinatus tendon was the most afflicted followed by the subscapularis and infraspinatus. Teres minor was not found in any of the study's patients [11]. The discrepancy is in part based on study demographics and threshold for age-related change [17].

Finding in according to age group show most of injuries in age group more than ≥ 40 years, for partial tear seen in 15 in age ≥ 40 years and 12 less than forty, two patients with complete tear in younger patients while five in older patients. Same figure present in tenosynovitis three in older and only one in age group less than 40 years these result agreement with previous study by Koganti et al [11].

According many studies show the incidence of rotator cuff injuries increase with age mostly effect fifth and sixth decade of life which appear predominant occurrence. Authors stated the pathogenesis of injury of muscle through intrinsic processes [18]. Investigation of microvascular pathway appear limited of vascularization in cuff tissues when individual become older. These finding match many thesis stated

degeneration of tendon seen more prevalent with advance age [19]. Our study find the tear more common in age over 40 years.

The partial thickness tear appear on MRI is focal discontinuity of the tendons with great signal intensity on T2-WI. There might be finding of surface distressing and change in tendons caliber [20, 21]. Fat suppression sequence could aid show the tendons weakness. Some high grade partial thickness bursa side tear might be incorrect for full thickness tear [20]. MRI can assess the amount and outline of rotator cuff irregularities, detect anomalies of the cuff muscle and neighboring structure, and propose mechanical inequality inside the cuff [4]. Additionally, MRI can offer facts about RCT including tears dimension, is required for optimal treatment planning and prognostic accuracy [3].

CONCLUSION

MRI have an supportive role in diagnoses grading and treatments arrangement of shoulder joint injuries. Rotator cuff are effected more than other muscles in shoulder and supraspinatus is common site. We suggest to used MRI as a first line images modalities in each suspected case of shoulder joint problem.

AUTHOR'S CONTRIBUTION

1. A. study design; B. data collection; C. statistical analysis; D. data interpretation; E. manuscript preparation; F. literature search; G. funds collection
2. A. study design; D. data interpretation; E. manuscript preparation; F. literature search
3. D. data interpretation; E. manuscript preparation

CONFLICT OF INTERESTING

None

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