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Detection of the Rotator Cuff Tendons Tears by Ultrasound in Sudanese Housewives with Chronic Shoulder Pain

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Abstract: ***The purpose of this study is to evaluate the sonographic findings of the rotator cuff tendons for the presence of partial and full-thickness tears using ultrasonography in Sudanese housewives with shoulder pain, as well as to correlate the findings with their ages, pain side and period of pain. Materials and Methods: The study sample involved 38 consecutively enrolled subjects who had shoulder pain, they have been classified into different groups according to their ages, affected shoulder and pain duration. All subject undergone MRI examination of the shoulder joint to detect the presence of RC tendon tears. Ultrasound of shoulder was performed by a musculoskeletal sonographer according to a define protocol that included imaging of the four rotator cuff tendons and the data obtained have been analyzed. Results: 16 (42.1%) of subjects showed supraspinatus partial tears, whereas 3 (7.9%) showed full thickness tears. 2 (5.3%) cases revealed infraspinatus partial tears. No partial or full thickness tears detected to terse minor and subscapularis tendons. The most affected age group was between 55-64 and 65-75 years old women for supraspinatus, infraspinatus partial and supraspinatus full thickness tears consequently. The most injured shoulder was the right one 11 (28.9%) partial tears besides 3 (7.9%) full thickness tears for supraspinatus tendon while the left shoulder was the mostly injured 2 (5.3) for infraspinatus tendon. Conclusion: Ultrasound is able to detect the shoulder join diseases especially rotator cuff tears.***

Keywords: Rotator cuff tendons, ultrasonography, shoulder pain, partial/full thickness tears

1. Introduction

Rotator cuff (RC) disease is the most common cause of shoulder pain and dysfunction in adults. Tears of the rotator cuff are a common cause of shoulder pain and disability. Early diagnosis allows proper surgical treatment planning that can prevent functional impairment [1]

Rotator Cuff Tears (RCT) had been studied using Arthrography, Sonography, and Surgery to detect rotator cuff tears (D. Lawrence Burk et al., AJR 153:87-92, July 1989; These imaging techniques have different strengths and weaknesses, and their relative accuracies and roles in the diagnostic evaluation of rotator cuff disease should be examined. Arthrography is the traditional method of detecting rotator cuff tears and has a reported accuracy of 98-99% [2]. However, arthrography has the disadvantages of being invasive and relying on indirect visualization of the cuff. Sonography is noninvasive and has a reported accuracy of 87-94%. Unfortunately, sonography is an operator-dependent technique that does not allow visualization of the entire extent of the rotator cuff. MR imaging provides direct visualization of the entire cuff, and one early study reported an accuracy of 84%. The major disadvantages of MR imaging are the long examination time, expense, and that the study may be unsuccessful in very large or claustrophobic patients [3].

Tears occurring at the RC can be classified into partial-thickness or complete tears. Partial-thickness tears damage the soft tissue of the tendon, but do not completely severe it, whereas complete tears split the soft tissue of the tendon into two pieces and there is basically a hole in the tendon .Partial-thickness tears can be located on either the bursal or the articular side. It has been reported that most of the tears occur in a region about 1 cm medial to the tendon insertion. Partial-thickness rotator cuff tears (PTRCTs) are a common cause of shoulder pain, it has been reported that the incidence of PTRCTs is between 17% and 37% in the population [3.4]. and up to 80% in patients in their eighth decade of life.1,5 PTRCTs were difficult to diagnose before magnetic resonance imaging (MRI) and shoulder arthroscopy, therefore most scientific research has focused on full-thickness rotator cuff tears (FTRCTs). PTRCTs are generally classified according to their location and arthroscopic appearance[4].

Shoulder joint is the commonest joint to undergo musculoskeletal (MSK) USG examination. USG of shoulder is simple, cheap, fast and non-invasive imaging technology for detection of rotator cuff and non- rotator cuff abnormalities. Dynamic examination of shoulder can be carried out in multiple planes and areas of concern can be focused promptly to make a diagnosis. However, it has its own limitations such as high operator dependency, limited utility in evaluation of labral lesions, rotator cuff interval, in demonstrating subtle bony lesions and inter-observer variations [5].

This makes ultrasound imaging an essential adjunct to clinical examination when assessing a patient with suspected rotator cuff pathology. [2]

The aim of this study is to assess the ability of US as a diagnostic tool in the evaluation of RC tendons tears among

a group of housewives with chronic shoulder pain, all of them have already undergone shoulder MRI examination.

2. Material and Methods

The total study sample were 38 Sudanese house wives complain of chronic shoulder pain without known personal shoulder problems like fractures dislocations etc..., all of them undergone shoulder US examination. The variables used include age, affected side and shoulder pain duration. All variables included in data sheet of patients. Patient consent obtained.

The study carried out during the period from 2014 to June 2017 in the radiology department of Bashaer Hospital and a private ultrasound clinic in Gabal Awleyaa. Ultrasound scanning technique used A Mindray DP-20, date of manufacture (DOM) 1993 Mindray DP-22 and high resolution GE LOGIQ e ultrasound machine, (DOM) 2004 with a high frequency (7-12 MHz) linear-array transducer used for ultrasound scanning.

The examination of shoulder started with the long head of the biceps tendon (LHBT) with the patient sitting, facing the examiner, the elbow joint flexed at 90° and the arm supinated on the patient´s thigh. The probe was placed axially (transverse) at the anterior aspect of the shoulder searching for the bicipital groove, the LHBT appears as an ovular hyperechoic structure within the groove, surrounded by a small amount of fluid in the sheath. Both transverse and longitudinal views obtained, starting from the proximal aspect of the bicipital groove and extending distally to the musculotendinous junction.
For the evaluation of the SubScapuler tendon, the elbow joint flexed at 90°. The arm rotated externally. Long-axis scan performed; the probe placed axially, (transverse) approximately at the level of the coracoid process. The SubScapuler tendon appears as a convex, well-defined fibrillar echo structure. The probe swept up and down until its full width visualization achieved.

Modified Crass (Middleton position) applied to evaluate the Supraspinatus tendon (SupraS) with the arm posteriorly extended, flexed elbow, pointing directly posteriorly, and the palm of the hand placed on the ipsilateral iliac wing.

The (SupraS) tendon examined in long-axis and short-axis views. The greater tuberosity and the humeral head were the important bone landmarks during the SupraS tendon examination. In long-axis view, the SupraS tendon visualized as convex beak-shaped hyperechoic structure over the smooth hypoechoic band of the articular cartilage and the hyperechoic humeral cortex, ending into the great tuberosity. In short-axis view, the SupraS tendon has a convex shape, composed of homogeneous texture of medium-level echoes.

The subacromial-subdeltoid bursa appears as a hypoechoic linear line between two hyperchoic linear planes. The forearm placed across the chest and the palm placed on the opposite shoulder to evaluate the Infraspinatus and teres minor tendons. The infraspinatus and terse minor muscles appear as an individual structure filling the infraspinous fossa deep to the deltoid. After scanning these muscles, the transducer swept toward the greater tuberosity on sagittal planes [6].

3. Data Analysis

All of the statistical analyses performed using Statistical Package for Social Sciences software package (SPSS for Windows, Version 16 Chicago, IL, USA). The frequency and percentages calculated for each variable in the sample.

4. Results

Table 1: Shows distribution of the study sample according to age

Age	Frequency	Percent
25-34	3	7.9
35-44	4	10.5
45-54	8	21.1
55-64	17	44.7
65-75	6	15.8
Total	38	100

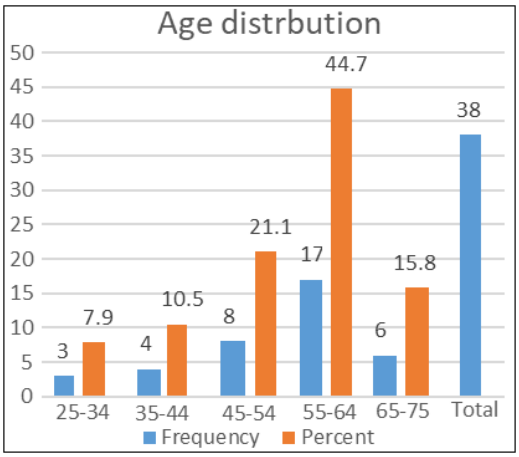

Figure 1: Distribution of the study sample according to age

Table 2: Distribution of the study sample according to affected Side

Affected side	Frequency	Percent
Right	26	68.4
Left	12	31.6
Total	38	100

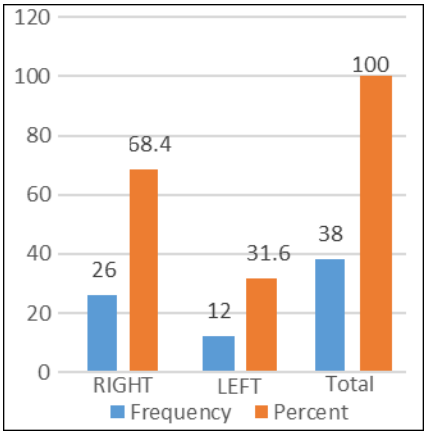

Figure 2: Distribution of the study sample according to Pain Side

Table 3: Shows the Ultrasound findings for the sub scapular tendon tears

SUP.S	Frequency	Percent
Normal	19	50
Partial Tear	16	42.1
Full thickness Tear	3	7.9
Total	38	100

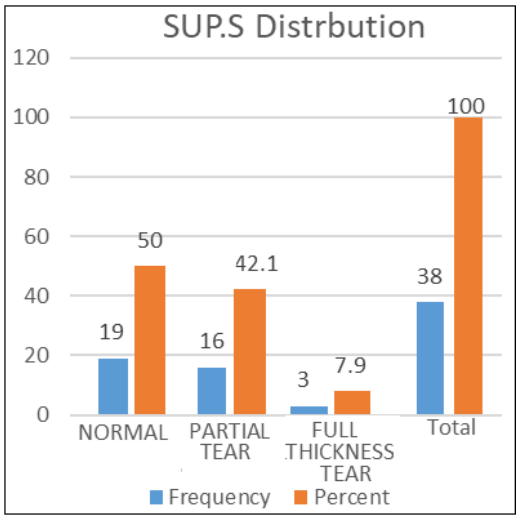

Figure 3: Shows the distribution of Ultrasound findings for the sub scapular tendon tears

Table 4: Shows the distribution of Ultrasound findings for the infraspinatus tendon tears.

IS	Frequency	Percent
Normal	36	94.7
Partial Tear	2	5.3
Total	38	100

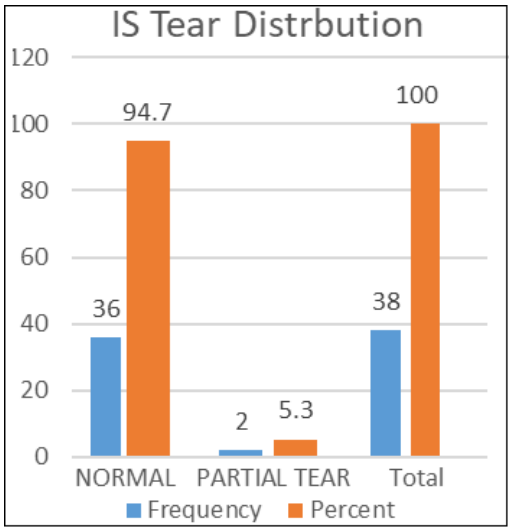

Figure 4: Shows the distribution of Ultrasound findings for the infraspinatus tendon tears

Table 5: Shows the relation between participant's age and Ultrasound findings for the supraspinatus tears

Age	Normal	Partial Tear	Full thickness Tear	Total
25-34	3	0	0	3
35-44	2	2	0	4
45-54	3	4	1	8
55-64	10	7	0	17
65-75	1	3	2	6
Total	19	16	3	38

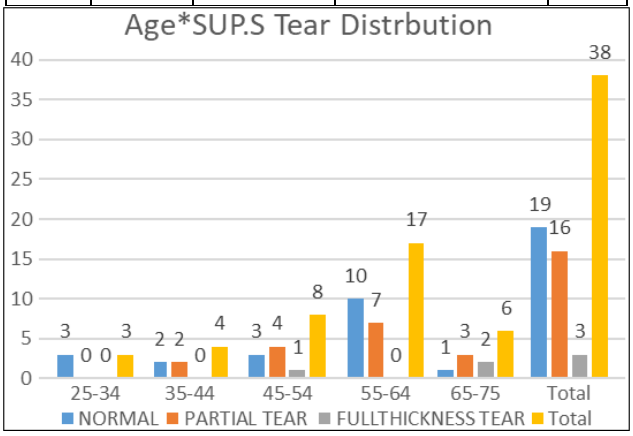

Figure 5: Shows the relation between participant's age and Ultrasound findings for the supraspinatus tears

Table 6: Shows the relation between participant's age and Ultrasound findings for the infraspinatus tears

Age	Normal	Partial Tear	Total
25-34	3	0	3
35-44	4	0	4
45-54	8	0	8
55-64	15	2	17
65-75	6	0	6
TOT	36	2	38

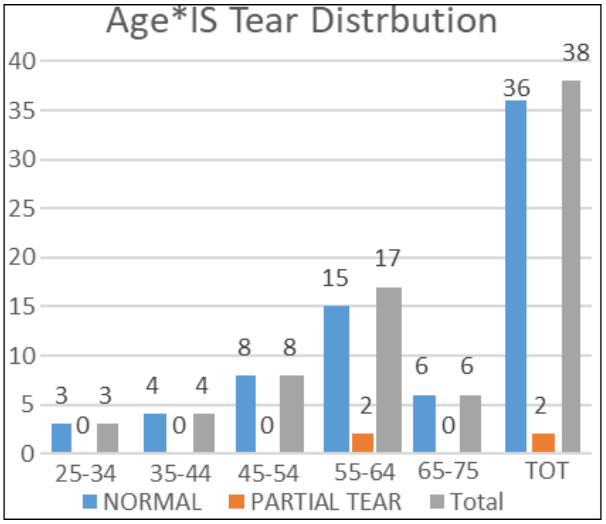

Figure 6: Shows the relation between participant's age and Ultrasound findings for the infraspinatus tears

Table 7: Shows the relation between pain side and Ultrasound findings for the supraspinatus tears

P.Side	Normal	Partial Tear	Fullthickness Tear	Total
Right	12	11	3	26
Left	7	5	0	12
Total	19	16	3	38

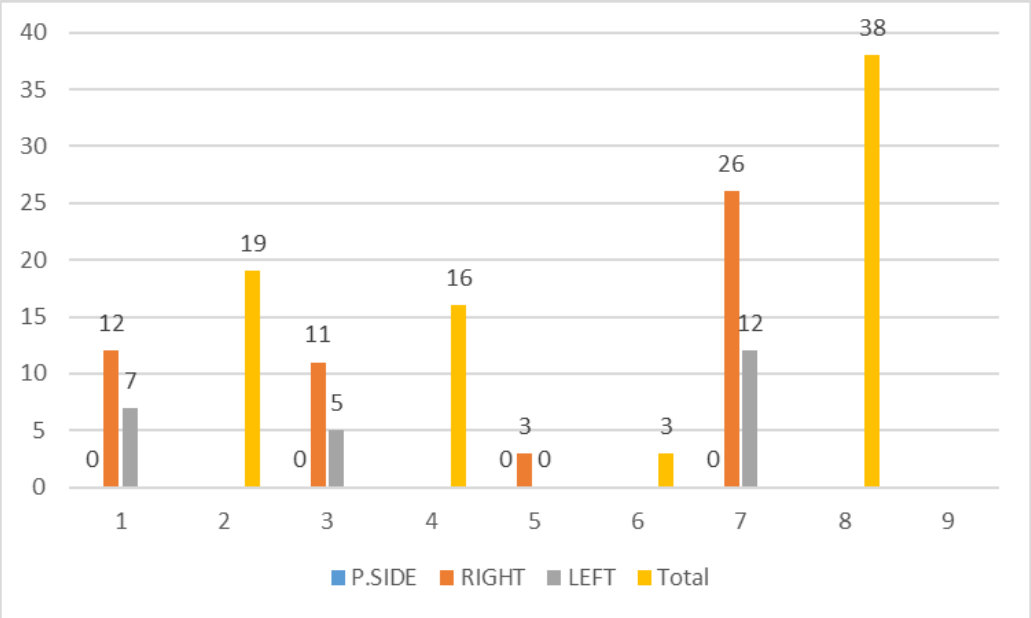

Figure 7: Shows the relation between pain side and Ultrasound findings for the supraspinatus tears

Table 8: Shows the relation between pain side and Ultrasound findings for the infraspinatus tears

P.Side	Normal	Partial Tear	Total
Right	26	0	26
Left	10	2	12
Total	36	2	38

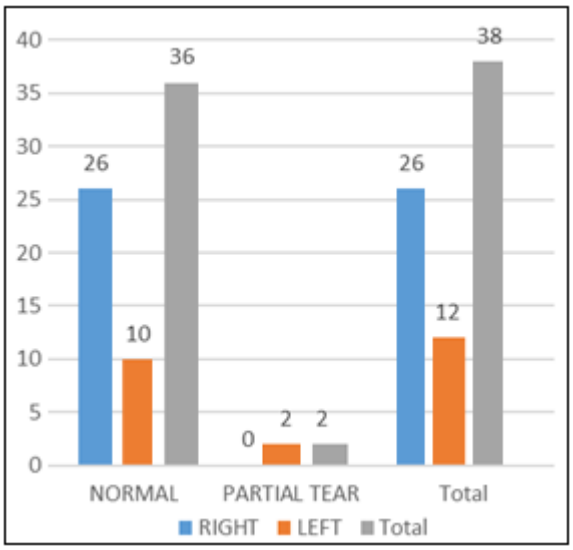

Figure 8: Shows the relation between pain side and Ultrasound findings for the infraspinatus tears

5. Discussion

Shoulder pain is one of the most common causes of illnesses in patients visiting orthopedic clinics. In the current study, rotator cuff pathologies found to be the commonest cause for referral to MRI department. All subject undergone MRI examination of the shoulder joint to detect the presence of RC tendon tears. Which found similar to study carried out by (Mitchell C et al, 2005). 38 patients were enrolled and ultrasonography. Table (1) and Figure (1) showed frequency distribution of patients ages (25-34) were 3 patients (7.9%), (35-44) were 4 patients (10.5%), (45-54) were 8 patients (21.1%), (55-64) were 17 patients (44.7%) and patients between (65-75) years old were 6 (15,8%).The patients mean age was 49.40± 12.4, maximum age was 75 and minimum was 25 years old, the most common affected age between 55-64 years old .

Table (2) and figure (2) were presented the distribution of the study sample according to pain side showed 26 patients (68.4%) with right shoulder pain this side is more pain than the left side that showed 12 (31.6%) with left shoulder pain.

The Ultrasound findings appeared the normal supraspinatus tendon was 19 (50%) and the affected supraspinatus tendon was 16 (42.1%) of the partial tears and 3 (7.9%) of the full thickness tears.

In table (4) sowed the normal infraspinatus tendon was 36 (94.7%) and 2 (5.3%) was partial tears of the infraspinatus tendon our study observed there is no full thickness tears.

In table (5) Shows the relation between participant's age and Ultrasound findings for the supraspinatus tears observed the partial tear was 2 patients (35-44) years, 4 (45-54) years, 7 (55-64) years and 3 (65-75) years. In addition, full thickness for 1(45-54) years and 2 (65-75) years, so that the partial tear of the supraspinatus tears was more than the full thickness. Whereas table 6 showed the relation between participant's age and Ultrasound findings for the infraspinatus tears we observed the partial tear was 2 for (55-64) years only and all of the other findings is normal.

Table (7) shows the relation between pain side and Ultrasound findings for the supraspinatus tears the analysis explained the right side showed 12 partial tear and 3 full thickness tear however left side showed 5 partial tear and no full thickness tear, that may be cause the right side was high incidence more than the left, because the right side is used more than the left side . Table (8) showed the relation between pain side and Ultrasound findings for the infraspinatus tears we fined 2 patient having partial tear in the left side only.

6. Conclusions

Ultrasound can be able to detection the shoulder join diseases especially rotator cuff tear full or partial tear, for that we recommended use ultrasound as the first tool in evaluation of the rotator cuff tendons tears among house wives with chronic shoulder pain.

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