

Ultrasound of the Rotator Cuff: A Comparison of Ultrasonographic and Physical Examination Finding in Seventy Consecutive Cases

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Abstract

Background : Shoulder pain is a common problem that can pose difficult diagnostic and therapeutic challenges for the family physician. It is the third most common musculoskeletal complaint in the general population, and account for 5% of all general practitioners musculoskeletal consults.

Objective: To determine the diagnostic performance of ultrasonography compared with the physical examination for detection of rotator cuff tears in painful shoulder syndrome.

Method: Prospective study was done on seventy patients (48 male, 22 female), age ranged between 30-70 years (mean age 50 years), From February 2007 to July 2011, were subjected to comparative study in Al-Kindy

teaching hospital with rotator cuff tears, including physical and ultrasonographic examination.

Result: Ultrasound examination confirmed the presence of rotator cuff tear in 58 patients (82.8%), about two third of them below age 40 (65.7%) and male gender (68.6%).

Conclusion: Ultrasonography which is non-invasive, safe; cheap with no known risk like radiation is a sensitive and accurate method of identifying patients with rotator cuff tears, and should be used wherever possible to improve diagnosis and treatment of painful shoulder disorders.

Keyword: rotator cuff tear, physical examination and ultrasound

Introduction

Shoulder pain is a common problem that can pose difficult diagnostic and therapeutic challenges for the family physician, and shoulder disorders are common, with as many as 20% of people experiencing shoulder problems at some stage in life.⁽¹⁾ Periarticular shoulder disorders are the most common cause of shoulder pain encountered by general practitioners and musculoskeletal specialists,⁽²⁾ and the shoulder pain is identical to that of neck pain in 66% of patients.⁽³⁾ It is the third most common musculoskeletal complaint in the general population, and account for 5% of all general practitioners musculoskeletal consults. Shoulder pain is usually poorly localized with the exception of pain occurring in the acromioclavicular joint.⁽¹⁾

In 1972, Neer first introduced the concept of rotator cuff impingement to the literature, stating that it results from mechanical impingement of the rotator cuff tendon beneath the anteroinferior portion of the

acromion, especially when the shoulder is placed in the forward-flexed and internally rotated position.⁽⁴⁾

The use of ultrasonography for detection of rotator cuff tears has achieved only limited acceptance by orthopedic surgeons compared with other modalities such as magnetic resonance imaging. Uncertainty about the accuracy of this modality may have contributed to its low utilization rate.

In our study we examine the patients with suspected rotator cuff tear clinically and to evaluate the result with ultrasound finding for assessment of rotator cuff tear diagnosis in painful shoulder syndrome.

Methods

From February 2007 to July 2011, a seventy patient were subjected to prospective comparative study in Al-Kindy teaching hospital.

A detailed history was taken and physical examinations were obtaining for all of the patients include the detection of atrophy,

swelling, tenderness or crepitus. Range of motion both active and passive type were evaluated in all plains and we concerned with painful arc (60 -120 degree) of active abduction ⁽⁵⁾, in addition we concentrated on strength, special tests and Jobs test for painful arc syndrome. ⁽⁶⁾

All patients were examined by high resolution ultrasound equipment (Philips) using 7.5 MHZ liner phased array transducer. All patients had standardized bilateral ultrasonography of the shoulder and the examination was performed with the patient seated on a stool and the radiologist standing behind the patient.

The long head of biceps tendon is examined with the intertubercular groove, in both the transverse and longitudinal planes, with the patients arm in a neutral position and elbow flexed to 90 degree. The presence of fluid around the tendon is noted, and search for fluid in the sub deltoid bursa is made. With the shoulder externally rotated, the subscapularis tendon is brought into view and examined in both planes. Then the patient is asked to rotate the shoulder internally in order to evaluate the supraspinatus and infraspinatus tendons (as shown in the image 1 and 2) in both transverse and longitudinal planes. ^(7, 8)

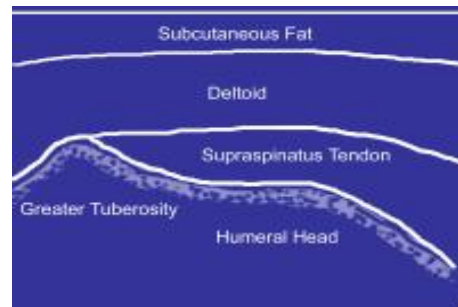
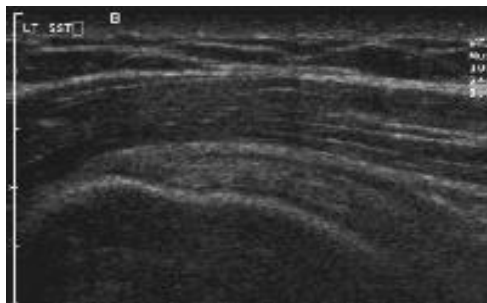


Image1: Longitudinal ultrasonographic view of the normal supraspinatus tendon and its diagram (cited from SP Tan *et al* ⁽⁷⁾)

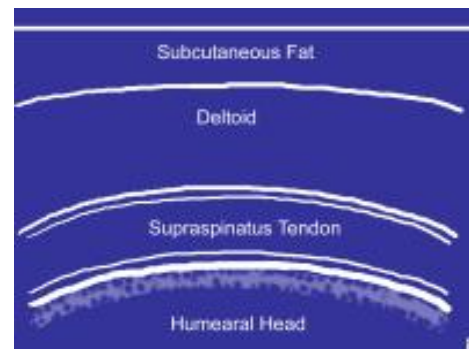
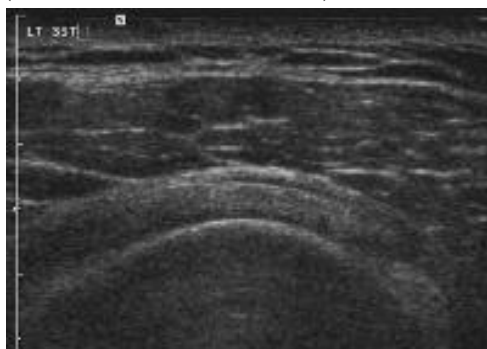


Image2: Transverse ultrasonographic view of the normal supraspinatus tendon & its diagram (cited from Josh B. *et al* ⁽⁸⁾)

Results

Our result shown that about two third of our patients presenting with rotator cuff syndrome below age 40 (65.7%) and about

two third (68.6%) were male gender and (72.9%) involving the dominant side. Light worker patient found to be a high incidence

of cuff tear 48 patients (68.5%) as compared with heavy worker occupation. Table 1 Majority of patients have history of night pain which present in 66 patients (94.3 %). Sixty eight patient (97.1 %) described some sort of limitation of movements especially flexion, abduction and internal rotation, and history of trauma is present in 57 (81.4 %) patients. Table 2 Regarding physical examination we found muscles atrophy around the shoulder region in 18 patients (25.7 %), painful arc in 54

patients (77.1 %) and in 58 patients (82.8 %) the Jobs test were positive. Figure 1 The ultrasonography and the physical findings were correlated with regard to the presence or absent of a rotator cuff tears, we found that the ultrasound confirmed the presence of supraspinatus tear in 58 (82.8 %) of patients having the clinical symptoms , and it was negative in 12 (17.2%) of the patients with clinical symptoms. Figure 2

Table 1: The relation of age, sex, side, and occupation.

Patient	Age			Sex		Side		Work	
	<40	40- 60	>60	Male	Female	Dominant	Non	Heavy	Light
No.	46	13	11	48	22	51	19	22	48
%	65.7	18.6	15.7	68.6	31.4	72.9	27.1	31.4	68.6

Table 2: The relation of trauma, night pain and limitation of movement

Patients	Trauma		Night pain		Limitation Of * Movement	
	Yes	No	Yes	No	Yes	No
No.	57	13	66	4	68	2
%	81.4	18.6	94.3	5.7	97.1	2.9

* Especially flexion, abduction and internal rotation.

Figure 1: Finding of the physical examination

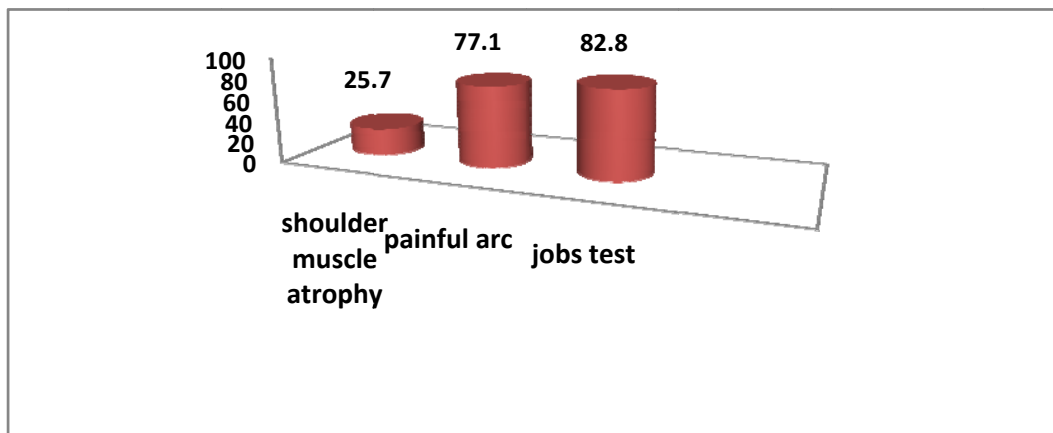
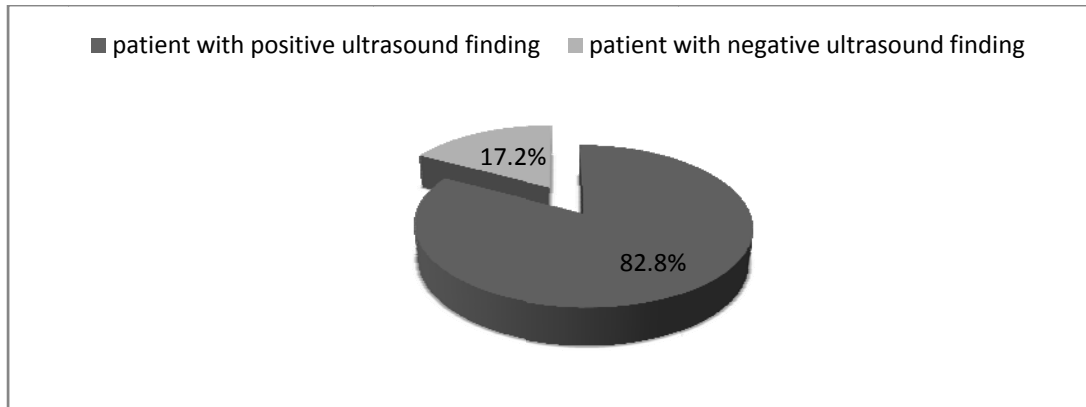


Figure 2: Ultrasound findings.



Discussion

Many rotator cuff tears cause no pain nor produce any symptoms, tears are known to have an increasing incidence with increasing age. The most frequent cause of rotator cuff damage is age related degeneration and less frequently by sports injuries or trauma.

In 1960 only plain films were available for the evaluation of painful shoulder. Later on many diagnostic tools have been developed to assess the diagnosis of the shoulder problem specially the rotator cuff tear like arthroscopy, sonography and magnetic resonance imaging, and the initial studies published in the mid-1980s, that compared ultrasonographic and surgical findings show a high rate of accuracy.⁽⁹⁾

The total number in our study is seventy patients complaining of shoulder pain 82.8% of them found to have supraspinatus tear by ultrasound and this is complies with others.⁽¹⁰⁾

The mean age of our patient was 50 years and this parallel with other^(11, 12), and this confirms that the degenerative process of rotator cuff is an important factor in rotator cuff pathology.

Regarding the patient gender we found 48 males (68.6%) and 22 females (31.4%), with rotator cuff tear, and this complies with others^(13, 14). This probably because the

males are involved in more strenuous exercise.

The dominant side was affected in 51 patients (72.9%), while the non dominant side was involved in 19 patients (27.1%) and is parallel with finding in other study⁽¹⁵⁾. This obviously due to overuse of the dominant side in activities that may predispose to rotator cuff pathology and at the same time more susceptible to trauma.

History of trauma present in 57 patients (81.4 %) and this complies with result obtain by others⁽¹⁰⁾, this because of the load on the supraspinatus muscle when the arm is elevated, the inter-muscular pressure is raised reducing the blood flow making the tendon vulnerable to injury.

Muscle atrophy found to be present in 18 patients (25.7 %) while it absent in 52 patients (74.3%) and the night pain in 66 patients (94.3%) , while is absent in only four patients (5.7%), these result complies with findings of other researchers.⁽¹⁰⁾

Painful arc syndrome found to be present in 54 patients (77.1%) and the Jobs test is positive in 58 patients (82.8%). These results are complies with other research findings.⁽¹⁰⁾

Regarding the evaluation of rotator cuff tears by ultrasonography we found positive result in 58 (82.8%) patients having the clinical symptoms , and it was negative in

12 patients (17.2%) with clinical symptoms and these results complies with results of others⁽¹⁶⁾

The successful use of ultrasound to examine the shoulder depends on the operator, machine, and patients factors. Knowledge of the relevant anatomy and pathological appearances and experience in performing the technique are required of operators.

The ultrasonography was a high accurate and reliable technique for detecting rotator cuff tear in painful shoulders. The high accuracy is in part attributable to improved image resolution. However, more than with almost any other imaging modality that employed to evaluate the shoulder, the success of an ultrasonographic examination depends heavily on the experience of the operator.^(9, 16, 17, 18)

Ultrasound is always useful to perform bilateral comparison because often, especially in tendinopathy caused by micro trauma or sport injury, the contra lateral lesion is normal in echo structure and morphology.⁽¹⁹⁾

Ultrasounds provide a high degree of accuracy for detecting full thickness tears; provide bilateral information, better tolerated, and less expensive.

The disadvantage of ultrasound include along learning curve and reduced sensitivity in patient who are obese or who have severely restricted shoulder movement , in addition it cannot be used to directly image the subacromial space , and it provides no information about the inferior surface of acromioclavicular joint.

Finally, increase awareness of the important role that ultrasonography can play in the diagnosis of rotator cuff pathology may foster acceptance and increase the availability of this imaging modality to the orthopedic community.

Conclusion

We conclude that history and physical examination is the corner stone for evaluation of the rotator cuff pathology and can be supplemented by ultrasound which is valuable noninvasive, safe procedure for imaging of the rotator cuff.

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