

**Original article:**

## Study of evaluation of the role of high-resolution ultrasound in rotator cuff injuries

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### Abstract:

**Introduction:** The tendon is subject to "wear and tear" during the day to day activities. Spectrum of etiologies that can give rise to shoulder pain are acute trauma to a gamut of degenerative disorders associated with impingement syndrome.

**Material and methods:** 30 patients referred to the department of Radio diagnosis, Adesh Medical College and Hospital, Kurukshetra, Haryana with clinically suspected rotator cuff injuries were subjected to undergo USG after thorough history taking and clinical examination. After clinical evaluation, once a patient satisfied the inclusion and exclusion criteria for this study, he or she would undergo USG examination after giving consent.

**Results:** In our study USG had a sensitivity of 64%, specificity of 100%, PPV of 100%, NPV OF 35.71%, diagnostic accuracy of 70% and kappa degree of agreement of 0.37.

**Conclusion:** These results suggest that USG is less reliable in detecting rotator cuff tears than previously reported and a positive sonographic reading is more reliable than a negative one.

**Keywords:** USG , Shoulder pain

### Introduction:

The tendon is subject to "wear and tear" during the day to day activities. Spectrum of etiologies that can give rise to shoulder pain are acute trauma to a gamut of degenerative disorders associated with impingement syndrome. Repetitive active and passive forces render these tendons susceptible to degeneration leading to swelling of the tendon and a minor degree of subluxation.<sup>1</sup> The space between the humeral head and the acromion is sufficiently restricted that mild swelling of the interposed tendon with or without minor superior subluxation of the humeral head leads to impingement syndrome and rotator

cuff tears. High resolution ultrasound is non invasive, less expensive and non-ionizing modality with good sensitivity in detecting both rotator cuff and non rotator cuff disorder.<sup>2</sup>

On ultrasonography the size of the tears can be classified and the findings used as a basis for management decisions<sup>3</sup>. Ultrasonography can also reveal the presence of other abnormalities that may mimic rotator cuff tear including tendinosis, calcific tendinitis, subacromial subdeltoid bursitis, greater tuberosity fracture and adhesive capsulitis<sup>4</sup>.

#### **Material and methods:**

The main source of data for the study were patients from the following teaching Hospital attached to Adesh group of institutions, Adesh Medical College and Hospital, Kurukshetra, Haryana

30 patients referred to the department of Radio diagnosis, Adesh Medical College and Hospital, Kurukshetra, Haryana with clinically suspected rotator cuff injuries were subjected to undergo USG and MRI after thorough history taking and clinical examination.

**Study Period:** Two years

**Study Design:** Proportion study

#### **Inclusion criteria:**

The study includes

- All patients with clinical suspicious of rotator cuff injuries.
- Cases of all age groups irrespective of sex

#### **Exclusion criteria:**

The study will exclude

- Patient having history of claustrophobia.
- Patient having history of metallic implants insertion, cardiac pacemakers and metallic foreign body insitu.

After clinical evaluation, once a patient satisfied the inclusion and exclusion criteria for this study, he or she would undergo USG examination after giving consent.

**Ultrasound examination of the shoulder:** was carried out on GE Logic P9 machine using a high frequency transducer of 5-17 MHz. The rotator cuff tendons, muscles, ACJ, joint cavity and bursae were examined in various positions. Dynamic examination of shoulder were also carried out for impingement. Comparison with opposite shoulder was also done.

Data was entered into Microsoft excel sheet and was analyzed using EPI Info 7 version software.

#### **Results:**

The age of the patients with rotator cuff pathologies studied ranged from 23 to 76 years, with a mean of 46.6 +/- 2.08.

The patients involved in the study were divided into 3 age groups viz. <40 years, 41-50 years, >50 years. Majority of Rotator cuff injures were observed after 50 yrs of age in 40% of subjects. 30% at < 40 yrs and 41 to 50 yrs.

Of the 30 patients studied, 5(16.7%) were females and 25 (83.3%) were males. The mean age among females was 54 +/-1.98 and the mean age among males was 45.12+/- 2.2.

In our study 66.7% patients showed positive clinical test for Supraspinatus muscle, 6.7% for Infraspinatus injuries and Subscapularis respectively. 20% of patients showed positive clinical test for more than one muscle.

**Table 1 : USG findings in Tendon injuries**

		SS	IP	SUB	TM	BT
<b>Tendons</b>	<b>No tear</b>	17	29	26	30	30
	<b>Articular surface partial tear</b>	5	0	2	0	0
	<b>Bursal surface partial tear</b>	2	0	0	0	0
	<b>Full thickness tear</b>	3	1	2	0	0
	<b>Intrasubstance tear</b>	1	0	0	0	0
	<b>Tendinosis</b>	2	0	0	0	0
	<b>Total</b>	30	30	30	30	30

In USG it was observed that 11 patients had tendon tear of supraspinatus muscle, 1 patient had Infraspinatus tear, 4 patients had Subscapular tear and there was no tear in Teres minor and Biceps tendon. 2 patients had tendinosis of supraspinatus muscle.

**Table 2: Calcification diagnosed by USG**

		Frequency	Percent
<b>Supraspinatus</b>	<b>Absent</b>	29	96.7
	<b>Present</b>	1	3.3
<b>Infraspinatus</b>	<b>Absent</b>	30	100
<b>Subscapularis</b>	<b>Absent</b>	30	100
<b>Teres minor</b>	<b>Absent</b>	30	100
<b>Biceps tendon</b>	<b>Absent</b>	30	100

In our study only one patient had calcification in supraspinatus tendon.

**Discussion:**

Over the last two decades musculoskeletal USG has established itself as a versatile imaging modality in the fields of radio-diagnosis, sports medicine and rheumatology. It has gained its rightful place in literature along with MRI. <sup>5</sup>Cost effectiveness and ready availability are its biggest advantages in several clinical settings. The real time capability of ultrasound in conducting dynamic studies in areas like the shoulder is a very big asset. It helps to do quick comparison with the contra-lateral side, which is of great help in many difficult situations. It has its own limitations such as high operator dependency, long learning curve and problems of anisotropy. It has limited utility in evaluation of labrum, rotator cuff interval, and in demonstrating subtle bony lesions.<sup>6</sup>

Ultrasonography of rotator cuff is quick and painless. There is no risk of infection and in contrast to arthrography there is no discomfort following the procedure<sup>6</sup>. The simplicity, rapidity, low cost and accuracy of the examination make it especially attractive as a screening and presurgical staging study<sup>1</sup>

In our study most commonly involved tendon was supraspinatus (43.3%), followed by subscapularis (13.3%), infraspinatus (3.3%) with teres minor and biceps tendon least commonly affected (0%). This is consistent with the study conducted by Jerosch et al. It was a study conducted on the dissected specimen of shoulder joints of 122 patients; it was found that isolated supraspinatus involvement occurred in 78% cases<sup>7</sup>. It was also noted no tear occurred without the involvement of supraspinatus tendon. DePalma et al examined cadaver shoulder and showed similar finding of supraspinatus as the commonly affected tendon and the incidence and degree of tear increased with age<sup>8</sup>

#### **Conclusion:**

In our study USG had a sensitivity of 64%, specificity of 100%, PPV of 100%, NPV OF 35.71%, diagnostic accuracy of 70% and kappa degree of agreement of 0.37. These results suggest that USG is less reliable in detecting rotator cuff tears than previously reported and a positive sonographic reading is more reliable than a negative one.

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