Original Research Paper Radiology

A STUDY OF SUPRASPINATUS TENDON THICKNESS ON USG IN NORMAL vs SYMPTOMATC PATIENTS.

DR. YASH D PATEL 3rd year resident, Department of Radiology, VSGH, Ahmedabad

DR. CHHAYA J BHATT Professor, Department of Radiology, VSGH, Ahmedabad

DR. PRUTHA HIREN MANIARBHATT 3rd year resident, Department of Radiology, VSGH, Ahmedabad

DR. SLESHA KALPESH BHALJABHATT 3rd year resident, Department of Radiology, VSGH, Ahmedabad

KEYWORDS :

Objective:
To measure normal supraspinatus tendon thickness by ultra sonography in normal and symptomatic patients.

Introduction
Supraspinatus is one of the four muscles that make up the rotator cuff, the others being: infraspinatus, teres minor and subscapularis. Supraspinatus tendon is the most common tendon to be affected among rotator cuff(1). Evaluation of supraspinatus tendon thickness using USG machine give excellent diagnostic results with evaluation of associated pathologies of rotator cuff tendons can also be done. Shoulder joint USG is considered operator dependent but has proven good accuracy. The use of protocol driven examination, knowledge of normal anatomy, tendon orientation and familiarity with image pitfalls can improve individual performance. With an experienced sinologist and good equipment, accuracy of USG equals than of MRI for partial thickness tear.(3)

Method & materials
Sixty patients were examined in this study. Out of which 30 patients were without any complain of pain or movement restriction at shoulder joint with age group between 30-50 years. Gender equality was maintained in the study.

Rest of the 30 patients were symptomatic with complains of pain /or movement restrictions at shoulder joint with age group between 30-50 years. Gender equality was maintained in the study.

The main aim of the study was to evaluate average thickness of supraspinatus tendon thickness in patients and to evaluate association of reduced thickness with presentation of symptoms like pain or restriction of movements at shoulder joint.

In this study USG of selected patients was done by TOSHIBA NEMIO NX USG machine with high frequency probe with patient in sitting position. The examiner was standing in front of the patient during the scan. Minimum patient discomfort with adequate kinetic motion evaluation was performed in all the patients.

The evaluation of thickness of supraspinatus tedon was done along its long axis in its maximum thickness in all patients. Apart from thickness of supraspinaus tendon four other findings were observed,

- Associated supraspinetus tendon tear.
- Peritendinus fluid collection.
- Fluid Collection in Subdeltoid bursa.
- Fluid collection in bicipital grove.

Technique
There are various techniques for scanning of the shoulder joint some prefers to face the patient and others prefer standing back of the patient. For US evaluation of the shoulder, we prefer to scan facing the front of the patient rather than behind the patient. The patient is sitting on a stool equipped with a short back support, which allows patient stability and US access to all aspects of the shoulder. The author also prefers to sit on a stool with wheels to allow mobility. The sonographer should perform the examination in a comfortable position so as to avoid developing work-related injuries. To reduce strain, the sonographer should ideally be positioned so that his or her shoulder is higher than the patient's shoulder, and the elbow should be close to the body rather than extending the arm toward the patient. The transducer should also be held at its end, stabilizing the transducer by resting either the edge of the hand or the little finger on the patient, which also reduces strain on the shoulder and allows fine motor control during US scanning.

In order to visualize the suprsspinatus tendon the patients are asked to place there hand on their back pocket. Elbow is drawn backwards during the scan, this position makes the arm less internally rotated and proper evaluation of anterior border of supraspinatus tendon a common site of tear. Apart for this it gives better evaluation in passive internal and external rotation.(2)Various patterns of supraspinatus tendon tear occurs.

- Full thickness tear.
- Partial thickness tear.

1. Articular surface tera.
2. Bursal surface tear.

At the beginning of the examination, obtaining a brief history can provide clues for correlation of results. Information with regard to trauma, mass, or infection is also helpful

With regard to US equipment, image resolution improves as the frequency of the transducer increases, but this is at the expense of depth penetration. We have used an high freguency ultrasound probe of at 7 MHz to scan all the individuals with using TOSHIBA NEMIO NX USG machine.

Anatomy

Origin

The supraspinatus muscle arises from the supraspinous fossa, a shallow depression in the body of the scapula above its spine. The supraspinatus muscle tendon passes laterally beneath the cover of the acromion.

Insertion

The supraspinatus tendon is inserted into the most superior facet of the greater tubercle of the humerus. The distal attachments of the three rotator cuff muscles that insert into the greater tubercle of the humerus can be abbreviated as SIT when viewed from superior to inferior (Supraspinatus, Infraspinatus, and Teres minor).

Innervation

The supraspinatus muscle is supplied by the suprascapular nerve (C5 and C6), which arises from the superior trunk of the brachial plexus, passes laterally through the posterior triangle of the neck and through the scapular notch on the superior border of the scapula. After supplying fibers to the supraspinatus muscle, it supplies articular branches to the capsule of the shoulder joint.

This nerve can be damaged along its course in fractures of the overlying clavicle, which can reduce the person's ability to initiate the abduction.

Action

Contraction of the supraspinatus muscle leads to abduction of the arm at the shoulder joint. It is the main agonist muscle for this movement during the first 15 degrees of its arc. Beyond 15 degrees the deltoid muscle becomes increasingly more effective at abducting the arm and becomes the main propagator of this action.

The supraspinatus muscle is one of the musculotendinous support structures called the rotator cuff that surround and enclose the shoulder. It helps to resist the inferior gravitational forces placed across the shoulder joint due to the downward pull from the weight of the upper limb.

The supraspinatus also helps to stabilize the shoulder joint by keeping the head of the humerus firmly pressed medially against the glenoid fossa of the scapula.

Commonly associated pathology

The supraspinatus muscle tendon is often ruptured in sports involving sudden forceful movements of the upper limb and is the most commonly ruptured rotator cuff muscle. The muscle can also degenerate in the elderly leading to increased instability and loss of function at the shoulder joint.

The supraspinatus tendon can also become inflamed, in persons of any age, leading to supraspinatus tendinitis which is often associated with shoulder impingement syndrome.

RESULTS:

Asymptomatic patients between age of 30-50 years, male

No.	Right	Left	Tear
1	11.0	9.6	
2	12.3	10.3	
3	10.4	11.2	
4	9.6	10.2	
5	10.7	10.5	
6	7.8	8.0	+
7	10.0	11.2	
8	13.3	12.0	
9	10.2	10.2	+
10	10.2	10.7	
11	11.0	9.3	
12	10.7	12.7	
13	12.6	13.5	
14	8.2	10.0	
15	8.0	9.5	
Average	9.9	10.5	

asymptomatic patients between age of 30-50 years, female.

No.	Right	Left	Tear
1	7.8	8.2	
2	7.2	7.0	
3	9.8	8.9	
4	10.0	7.0	+
5	11.2	10.2	
6	7.7	8.1	
7	8.4	5.9	+
8	9.5	10.2	
9	12.0	11.0	
10	6.9	7.3	+
11	10.3	11.1	
12	13.3	12.6	
13	10.1	7.9	
14	10.3	7.2	
15	7.6	9.7	
Average	9.6	8.8	

Symptomatic patients between age of 30-50 years, male.

No.	Right	Left	Tear
1	4.5	4.3	+
2	5.9	8.4	+
3	7.7	6.9	+
4	11.5	9.0	+
5	7.9	10.4	+
6	9.3	9.0	
7	8.3	8.8	+
8	8.0	10.1	+
9	8.3	8.4	+
10	5.0	9.4	+
11	9.0	7.7	+
12	7.4	9.4	
13	6.4	6.5	+
14	9.9	9.1	+
15	8.4	7.8	+
Average	7.8	8.3	

Symptomatic patients between age of 30-50 years, female.

No.	Right	Left	Tear
1	8.2	9.0	+
2	9.5	6.0	+
3	7.6	7.6	
4	6.9	7.0	
5	8.3	4.8	+
6	8.4	9.4	
7	8.7	8.2	+
8	6.1	9.3	
9	6.6	5.4	+
10	9.8	8.7	
11	11.3	9.1	
12	10.0	7.0	
13	6.5	7.6	+
14	8.0	4.5	+
15	4.4	6.6	+
Average	8	7.3	

Average thickness of supraspinatus tendon.

	Normal individuals	Symptomatic patients
Male	10.2	8.0
Female	9.2	7.6
Total values	9.7	7.8

DISCUSSION:

The measurement of the supraspinatus tendon thickness using ultrasonography machine indicated excellent reliability with average of 9.7mm for normal individuals and average of 7.8mm for symptomatic patients.

5 out of 30 asymptomatic individuals were having partial tear of the supraspinatus tendon tear. 9 out of 30 symptomayic patients were not having supraspinatus tendon tear.

In symptomatic groups, male were more associated with supraspinatus tendon tear.

A degenerative rotator cuff is seen in 60% of cadavers above 40 years and 50-70% of individuals above the age of 65 years may have rotator cuff tear.(4)

References

1. Van Holsbeeck MT, et al. muscloskeletal ultrasound. 2nd ed p.464 .
2. Crass JR, craig EV, Feinberg SB. The hyperextended internal rotation view in rotator cuff ultrasound. J clin Ultrasound 1987:15:426-20.
3. Roy A. Rotator cuff Disease:eMedicine.
4. Kolowich P, Holsbeeck M. the 16th annual conference of Musculoskeletal ultrasound socity may 27-28, 2006