ORIGINAL RESEARCH ARTICLE

Accuracy of High Resolution Sonographic Evaluation of Painful Shoulder

U Syam Sunder Rao[1], A Ravikumar[2]

[1]Associate Professor, [2]Associate Professor, Department of Radiology, Fathima Institute of Medical Sciences, Kadapa, India

Corresponding author: Dr. U. Syam Sunder Rao, Door. No: 20/947, Flat No: 201, S.V. Heights, Opposite to Police Guest House, Co-operative Colony, Kadapa-516001, Andhra Pradesh, India

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A B S T R A C T

Introduction: Shoulder pain is a most common condition that has difficult diagnostic and therapeutic challenges for orthopeadician. This study aimed to show that ultrasound done by a two, experienced radiologist by using sophisticated equipment is specific and sensitive in diagnosing a rotator cuff injury including partial thickness tears.

Material and Methods: This was a prospective study done in department of radiology, Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh. This study was done on 50 patients who were treated by 8 years experienced radiologist by using ultrasound for a period of two years from October 2015 to November 2017.

Results: A total of 50 patients were studied who were with shoulder joint pain in which pre-operative ultrasound was done followed by surgery within 10 months by one orthopaedic surgeon. The mean age was 55 years, the highest number of patients were in age range of 51-60 years, which was 16. Time from ultrasound to surgery ranged from 0 to 10 months, i.e. mean was 2.0 months. 25 out of 50 patients were found to have full thickness tears, 12 out of 50 had partial thickness tears and 13 out of 50 patients had bursitis with no evidence of a rotator cuff tears. Ultrasound correctly identified 23 out of 25 full thickness tears. No negatives were observed for ultrasound. It failed to identify 2 full thickness tears, one which was due to florid bursitis and another patient had high grade partial thickness tears with associated moderate tendinopathy. Ultrasound correctly identified 10 out of 12 partial thickness tears. Two reported as partial high grade tears. Two small partial thickness were not seen at sonography. These have been reported as supraspinatus tendinopathy and bursal thickening associated. In this study, ultrasound showed sensitivity of 90%, specificity of 100%; for full thickness tears, positive predictive value was 100% and a sensitivity of 80%; for partial thickness tears, specificity was 95% and PPV was 88%.

Conclusion: In assessment of rotator cuff tear, USG can be used as first line of diagnostic tool in investigating shoulder pain in patients. It has high sensitivity and specificity for full thickness tear and partial thickness tear.

Key Words: High Resolution Sonographic, Painful Shoulder

INTRODUCTION

Painful shoulder is a very common rheumatologic condition that results from periarticular lesions involving the rotator cuff, the biceps tendon, and the subacromio- subdeltoid bursa. The incidence of shoulder pain is 6.6 to 25 cases per 1000 patients, with a peak incidence in the fourth through 6 th decades.[1] The challenge for orthopeadician to evaluate shoulder pain is the myriad of etiologies and the potential for multiple disorders. [2]

The currently it is that inflammation of the rotator cuff tendons and/or bursa, caused by irritation against the coracoacromial arch, can progress to a complete rotator cuff tear over time. For detection of rotator cuff and non-rotator cuff abnormalities, USG of shoulder is fast, simple, cheap and non-invasive imaging technology. In the last few decades, high resolution USG has emerged as widely used diagnostic tool for pathologies of musculoskeletal. In evaluation of shoulder injuries, rheumatologists, physicians dealing with sports medicine use ultrasound. [3-6]

Ultrasonography (US) is a most useful diagnostic method that can be easily applied to identify the cause of shoulder pain. It is low cost, good diagnostic accuracy, and capability for dynamic evaluation are also advantages. To assess all possible causes of shoulder pain, it is better to follow a standardized protocol and to perform detailed evaluation of the shoulder. Hence this study aimed to show that ultrasound done by a two, experienced radiologist by using sophisticated equipment is specific and sensitive in diagnosing a rotator cuff injury including partial thickness tears.

MATERIAL AND METHODS

This was a prospective study done in department of radiology Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh. This study was done on 50 patients who were treated by 8 years experienced radiologist by using ultrasound for a period of two years from October 2015 to November 2017. Inclusion criteria was in either of the shoulder history of pain, history of restricted movements in either shoulder, rotator cuff injury, injury of biceps tendon, calcific tendinitis etc. Exclusion criteria was patients with glenoid labral pathologies, instability disorders, electrically, mechanically or magnetically, activated implants, claustrophobia. Once a patient satisfies the inclusion and exclusion criteria, he or she

was made to undergo sonographic evaluation of the affected shoulder. Ethical Committee approval was taken and patient informed consent was taken. USG: The affected shoulder was carried out with high frequency linear array transducer. The patient was made to face the USG machine, by making him sit on a rotating stool and examination of the affected shoulder was done. And it was compared to opposite side. In USG, major and minor criteria was evaluated for the rotator cuff. Major criteria was focal abnormal echogenicity, cuff discontinuity, focal and cuff non visualisation. Minor criteria was biceps tendon sheath fluid and sub-deltoid bursa examination, concave subdeltoid bursal contour, irregularity of the greater tuberosity and compressibility. Full thickness tear and partial thickness tear was also evaluated.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Descriptive statistical analysis was done to interpret the results.

RESULTS

In this study, a total of 50 patients were studied who were with shoulder joint pain in which pre-operative ultrasound was done followed by surgery within 10 months by one orthopaedic surgeon. Table 1 shows that the mean age was 55 years, the highest number of patients were in age range of 51-60 years, which was 16. Time from ultrasound to surgery ranged from 0 to 10 months, i.e. mean was 2.0 months.

Table 2 shows 25 out of 50 patients were found to have full thickness tears, 12 out of 50 had partial thickness tears and 13 out of 50 patients had bursitis with no evidence of a rotator cuff tears.

Table 3 shows that ultrasound correctly identified 23 out of 25 full thickness tears. No negatives were observed for ultrasound. It failed to identify 2 full thickness tears, one which was due to florid bursitis and another patient had high grade partial thickness tears with associated moderate tendinopathy.

Table 4 shows that ultrasound correctly identified 10 out of 12 partial thickness tears. Two reported as partial high grade tears. Two small partial thickness were not seen at sonography. These have been reported as supraspinatus tendinopathy and bursal thickening associated.

In this study, ultrasound showed sensitivity of 90%, specificity of 100%; for full thickness tears, positive predictive value was 100% and a sensitivity of 80%; for partial thickness tears, specificity was 95% and PPV was 88%.

Age Range (Years)	
20-30	5
31-40	10
41-50	13
51-60	16
61-70	3
71-80	3
Sex Distribution	
Males	30
Females	20

Table-1: Demographic distribution in the study.

Full thickness tears	Partial thickness tears	Bursitis
25	12	13

Table-2: Rotator cuff tears.

Ultrasound	Surgery for full thickness tear		
	Positive	Negative	Total
Positive	23	0	23
Negative	2	23	25
Total	25	23	48

Table-3: For full thickness rotator cuff tears, ultrasound versus surgical.

Ultrasound	Surgery for full thickness tear		
	Positive	Negative	Total
Positive	10	2	12
Negative	2	35	37
Total	12	37	49

Table-4: For Partial thickness rotator cuff tears, ultrasound versus surgical.

DISCUSSION

In the present study, a total of 50 patients were studied who were with shoulder joint pain in which pre-operative ultrasound was done followed by surgery within 10 months by one orthopaedic surgeon. The mean age was 55 years, the highest number of patients were in age range of 51-60 years, which was 16. Time from ultrasound to surgery ranged from 0 to 10 months, i.e. mean was 2.0 months. 25 out of 50 patients were found to have full thickness tears, 12 out of 50 had partial thickness tears and 13 out of 50 patients had bursitis with no evidence of a rotator cuff tears. Ultrasound correctly identified 23 out of 25 full thickness tears. No negatives were observed for ultrasound. It failed to identify 2 full thickness tears, one which was due to florid bursitis and another patient had high grade partial thickness tears with associated moderate tendinopathy. Ultrasound correctly identified 10 out of 12 partial thickness tears. Two reported as partial high grade tears. Two small partial thickness were not seen at sonography. These have been reported as supraspinatus tendinopathy and bursal thickening associated. In this study, ultrasound showed sensitivity of 90%, specificity of 100%; for full thickness tears, positive predictive value was 100% and a sensitivity of 80%; for partial thickness tears, specificity was 95% and PPV was 88%. Jean Sebastian Roy et al;[7] conducted a systematic search in three databases was conducted. Two raters performed data extraction and evaluation of risk of bias independently, and agreement was achieved by consensus. Hierarchical summary receiver-operating characteristic package was used to calculate pooled estimates of included diagnostic studies. Diagnostic accuracy of US, MRI and MRA in the characterisation of full-thickness RC tears was high with overall estimates of sensitivity and specificity over 0.90. As for partial RC tears and tendinopathy, overall estimates of specificity were also high (>0.90), while sensitivity was lower (0.67–0.83). Diagnostic accuracy of US was similar whether a trained radiologist, sonographer or orthopaedist

performed it. DM Cullen et al[8] conducted a study in which both diagnostic ultrasound and magnetic resonance imaging are used for investigation of the presence and severity of rotator cuff lesions. Compared the ultrasound and surgical results obtained from 68 patients. Ultrasound showed a sensitivity of 89% and specificity of 100% (Positive Predictive Value 100%) for full-thickness tears, and a sensitivity of 79% and specificity of 94% (Positive Predictive Value 87%) for partial-thickness tears. found that shoulder ultra- sound, in the hands of an experienced radiologist with the use of modern high-resolution equipment, is highly sensitive in differentiating complete tears and partial-thickness tears. Results are similar to the best published results for MRI and given that ultrasound is significantly cheaper and more available, ultrasound by an experienced radiologist should be considered as a primary diagnostic tool for imaging the rotator cuff. Sachin Khanduri et al;[9] conducted a study in which for partial thickness tear of supraspinatus, USG had a sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy of 60%, 97.6%, 95.5%, 74.1%, and 80.3%, respectively, as compared to 88.6%, 96.0%, 93.9%, 92.3%, and 92.9%, respectively, For full thickness tear of supraspinatus, USG had a sensitivity, specificity, PPV, NPV, and accuracy of 95.2%, 90.6%, 76.9%, 98.3%, and 91.8%, respectively, as compared to 95.2%, 98.4%, 95.2%, 98.4%, and 97.6%, respectively. Amandeep Singh et al;[10] conducted a study which was a prospective study included 50 patients referred for ultrasound and MRI because of shoulder pain. All patients were examined clinically, followed by radiography of the affected shoulder. High-resolution ultrasound examination of the involved shoulder was performed together with an examination of the contralateral normal shoulder, The majority of patients were in age group 56–65 years, 56% were males and 44% were females (of a total of 50 patients). A total of 40 patients were diagnosed as having rotator cuff tears on ultrasound (USG). USG showed complete-thickness tears in 25 patients and partial-thickness tears in 15 patients. In the diagnosis of rotator cuff tears, the strength of agreement ultrasound was good.

CONCLUSION

In assessment of rotator cuff tear, USG can be used as first line of diagnostic tool in investigating shoulder pain in patients. It has high sensitivity and specificity for full thickness tear and partial thickness tear.

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