International Journal of Pharmaceutical and Bio-Medical Science

ISSN(print): 2767-827X, ISSN(online): 2767-830X

Volume 05 Issue 02 February 2025

Page No : 131-132

DOI: https://doi.org/10.47191/ijpbms/v5-i2-08, Impact Factor: 8.163

Comparison of Physical Examinations and Ultrasonographic Findings in Patients with Painful Shoulder

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ABSTRACT

Background with Objective: High frequency ultrasonography is an accurate non-invasive imaging technique for evaluating patients with painful shoulder. The aim of this study was to compare the physical examinations with ultrasonographic findings in patients with painful shoulder.

Methods: This Prospective observational Study was carried out among 101 patients attending at the Department of Physical Medicine and Rehabilitation, Dhaka Medical College and Hospital (DMCH), Dhaka within the defined period from July 2021 to December 2021. Ethical clearance was obtained from the Ethical review committee of Dhaka Medical College Hospital. Purposive sampling was done according to availability of the patients. Statistical analyses of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-20.1).

Results: Majority of the patients (59.4%) were in 41-50 years age group where the mean age of the patients was 50.3 ± 7.9 years and 51 (50.5%) patients were male. On physical examination, 76 (75.2%) patients were Neer tests positive, 62 (61.4%) were Jobe's test for supraspinatus positive and 37 (36.6%) were Yegarson's test for the long head of the biceps brachii positive. Most of the patients (93.1%) were Patte's test for infraspinatus negative. USG findings shows that 47 (46.5%) had impingement, 30 (29.7%) had Osteoarthritis in acromioclavicular joint, another 30 (29.7%) had Supranpinatous tendinosis, 25 (24.8%) had Subdeltoid bursitis, 22 (21.8%) had partial tear of supraspinatous. Neer tests had 47.4% sensitivity and 56.0% specificity with 49.5% accuracy. Jobe's test for supraspinatus had 66.7% sensitivity and 40.8% specificity with 48.5% accuracy. Patte's test for infraspinatus had 95.8% accuracy and Gerber's lift-off test for subscapularis had 84.1% accuracy while Yegarson's test for the long head of the biceps brachii had 79.2% accuracy

Conclusion: Ultrasonography should be used wherever possible to improve diagnosis and treatment of painful shoulder.

KEYWORDS: Comparison, Physical Examinations, Ultrasonographic Findings, Painful Shoulder

ARTICLE DETAILS

Published On:
17 February 2025

Available on:
https://ijpbms.com/

INTRODUCTION

The shoulder is a complex structure that affords great mobility at the expense of stability. Shoulder pain is related to much different pathology, both articular structures and periarticular soft tissues. For this reason, it is often difficult to detect and identify the site of anatomical alteration with clinical examinations alone. Although a number of clinical tests used for the diagnosis of painful shoulder are considered accurate in determining the location of the periarticular lesions,[1] these entities may be difficult to differentiate by physical examination alone.[2] Radiography, computed tomography, magnetic resonance imaging (MRI), and sonography (US) imaging are validated imaging modalities that can be used to further narrow the differential diagnosis and direct patient care.[3] MRI is currently considered the reference standard for imaging in shoulder disorders. However, its limitations include high cost and limited availability.[4] Several features can be observed in shoulder MRI, such as thickening of the capsule and synovium adjacent to the axillary recess, changes in the coracohumeral ligament (CHL), and scarring within the rotator interval. US can also provide satisfactory images of the soft tissue change. US signs included CHL thickening, the presence of fibro-inflammatory soft tissue, and thickening of the inferior glenohumeral capsule.[5] Traditional clinical examination maneuvers are of limited diagnostic value and x-ray have a low yield when assessing soft tissue, ultrasonography (US) due to established reliability, efficiency and easy access has been identified as the best tool to assess shoulder pain.[2] The ultrasonography provides a non-painful, noninvasive, cost-efficient and fast imaging technique which is increasingly used to evaluate patients with musculoskeletal disorders.[6] Musculoskeletal ultrasound (MSK-US) provides static and dynamic visualization of important structures and their biomechanical relationships. Important structures include the lateral third of the acromion, the subacromial/subdeltoid bursa (SASD), supraspinatus tendon, and the head of the humerus. Ultrasound findings thought to be associated with impingement include bunching of the supraspinatus tendon and/or e subacromial/subdeltoid bursa beneath the acromion during abduction, bursal thickening, and bursal distention.[7] Shoulder sonography showed involvement of all structures in rheumatoid arthritis (RA), and involvement mainly of tendons in periarticular disorders (PD).[8]

MATERIALS & METHOD

This Prospective observational Study was carried out among 101 patients attending at the Department of Physical Medicine and Rehabilitation, Dhaka Medical College and Hospital (DMCH), Dhaka within the defined period from July 2021 to December 2021. Ethical clearance was obtained from the Ethical review committee of Dhaka Medical College Hospital. Purposive sampling was done according to availability of the patients. In this study, Q40 ultrasound machine was used. The Q40 is a fully-featured ultrasound machine with unique 3D/4D function Musculoskeletal ultrasound involves the use of high-frequency sound waves (3-17 MHz) to image soft tissues and bony structures in the body for the purposes of diagnosing pathology or guiding real-time interventional procedures. The collected data were entered into the computer and analyzed by using SPSS (version 20.1) to compare the physical examinations with ultrasonographic findings in patients with painful shoulder.

RESULTS

Majority of the patients (59.4%) were in 41-50 years age group where the mean age of the patients was 50.3 ± 7.9 years and 51 (50.5%) patients were male. **(Table 1)**

Table 1: Socio-demographic Characteristics of the study population (n=101)

Parameter	Number	percentage
Gender		
Male	51	50.5%
Female	50	49.5%
Age in years		
41-50	60	59.4
51-60	31	30.7
61-70	10	9.9
Mean ± SD (min-max)	50.3 ± 7.9 (41-70)	

On physical examination, 76 (75.2%) patients were Neer tests positive, 62 (61.4%) were Jobe's test for supraspinatus positive and 37 (36.6%) were Yegarson's test for the long head of the biceps brachii positive. Most of the patients (93.1%) were Patte's test for infraspinatus negative. **(Table 2)**

Table 2: Distribution of patients by physical examination (n=101)

Physical examination	positive	Negative
Neer tests for shoulder impingement syndrome	76 (75.2%)	25 (24.8%)
Jobe's test for supraspinatus	62 (61.4%)	39 (38.6%)
Patte's test for infraspinatus	7 (6.9%)	94 (93.1%)
Gerber's lift-off test for subscapularis	17 (16.8%)	84 (83.2%)
Yegarson's test for the long head of the biceps brachii	37 (36.6%)	64 (63.4%)

USG findings shows that 47 (46.5%) had impingement, 30 (29.7%) had Osteoarthritis in acromioclavicular joint, another 30 (29.7%) had Supranpinatous tendinosis, 25 (24.8%) had Subdeltoid bursitis, 22 (21.8%) had partial tear of supraspinatous **(Table 3).**

Table 3: Distribution of patients by USG findings (n=101)

USG findings	Frequency (n)	Percentage (%)
Normal	3	3.0
Impingement	47	46.5
OA in AC joint	30	29.7
Supranpinatous tendinosis	30	29.7
Subdeltoid bursitis	25	24.8
Partial tear of supraspinatus	22	21.8
OA glenohumoral	19	18.8
Bicepital tendinitis	16	15.8
Subscapularis tendinosis	13	12.9
Subscapularis calcific tendinitis	8	7.9
Supraspinatus calcific tendinitis	7	6.9
Subacromial bursitis	7	6.9
Bicepital tenosynovitis	7	6.9
Full thickness tear in supranpinatous	2	2.0
Partial tear in subscapularis tendon	1	1.0
Partial tear in infraspinatous	1	1.0
Infraspinatous calcific tendinitis	1	1.0

Neer tests had 47.4% sensitivity and 56.0% specificity with 49.5% accuracy. Jobe's test for supraspinatus had 66.7% sensitivity and 40.8% specificity with 48.5% accuracy. Patte's test for infraspinatus had 95.8% accuracy and Gerber's lift-off test for subscapularis had 84.1% accuracy while Yegarson's test for the long head of the biceps brachii had 79.2% accuracy **(Table 4)**

Table 4: Sensitivity and specificity of physical examination for the detection of US shoulder pathology

Physical examination	Sensitivity	Specificity	PPV	NPV	Accuracy
Neer tests	47.4	56.0	76.6	25.9	49.5
Jobe's test for supraspinatus	66.7	40.8	32.2	74.3	48.5
Patte's test for infraspinatus	100.0	94.9	28.6	100.0	95.8

Gerber's lift-off test for subscapularis	53.8	88.6	41.2	92.8	84.1
Yegarson's test for the long head of the biceps brachii	100.0	32.8	43.2	100.0	79.2

PPV= Positive predictive value, NPV= Negative predictive value

DISCUSSION

The mean age of the patients in this study was 50.3 ± 7.9 years which was comparable to the study of Khan et al. (2019)[9] and Choi & Kim (2020)[10]. In the study of Khan et al. (2019)[9] the mean age of the patients was 52 years while in the study of Choi & Kim (2020)[10]the mean age of the patients was 51 years. Though other studies conducted by Kim HA et al. (2007)[11] found predominant female patients with shoulder pain but in this study male to female proportion was almost equal. When patients were advised to do musculoskeletal ultrasonography, many female patients refused to do so. Female patients were mainly dependent to their families for financial support. On physical examination, 75.2% patients were Neer tests positive, 61.4% were Jobe's test for supraspinatus positive and 36.6% were Yegarson's test for the long head of the biceps brachii positive. Most of the patients (93.1%) were Patte's test for infraspinatus negative. Similar finding was reported by Khan et al. (2019)[9] in their study. However, Kim et al. (2007)[11] found less positivity of these patients regarding physical examination. USG findings shows that common pathologies of shoulder were impingement, Osteoarthritis in acromioclavicular joint , Supranpinatous tendinosis, Subdeltoid bursitis, and partial tear of supraspinatous. Naredo et al. (2002)[2], Deshpande et al. (2018)[12], Patidar et al. (2012)[13]found Supraspinatus tendon pathology was the most common finding. Subscapularis involvement was more common as compared to infraspinatus, which was similar to the study by Deshpande et al.(2018)[12] and Patidar et al. (2012)[13] which was not in accordance with studies done by Naredo et al. (2002)[2] Partial-thickness tears were more common than full-thickness tears in the present study which was in accordance with studies done by Deshpande et al. (2018)[12]. Neer tests had 47.4% sensitivity and 56.0% specificity with 49.5% accuracy. Jobe's test for supraspinatus had 66.7% sensitivity and 40.8% specificity with 48.5% accuracy. Patte's test for infraspinatus had 95.8% accuracy and Gerber's lift-off test for subscapularis had 84.1% accuracy while Yegarson's test for the long head of the biceps brachii had 79.2% accuracy. Physical examinations of painful shoulder are not very accurate compared with US diagnosis mainly for impingement and rotator cuff tear. Gschwend N et al. (1988) and Norwood et al. (1989) reported that low accuracy of physical examination compared with sonographic evaluation of painful shoulder. [14, 15] Leroux et al. (1995)[16] reported satisfactory sensitivity but poor specificity for clinical tests, particularly for determining the location and type of rotator cuff lesions; the probable explanation is the difference in populations. Norwood et al. (1989) [17] found that the characteristics of the pain and the site of tenderness were not helpful.

CONCLUSION

An ultrasonographic finding of shoulder is more sensitive than clinical examination for the diagnostic evaluation of painful shoulder. Consequently, it has the potential to become a preferred imaging modality for diagnosing shoulder pain as it is non-invasive, reflects the clinical features of shoulder pain and provides anatomical accuracy.

ACKNOWLEDGEMENTS

The authors are grateful to the entire staff of Physical Medicine and Rehabilitation department of the Dhaka Medical College and Hospital for their cooperation and support during the study period.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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