



Original Clinical Research

A sono-clinical study: Is probe palpation better than a cross arm test for detecting acromio-clavicular joint pathology in chronic painful shoulder?

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Abstract

Objective: This prospective study was undertaken to determine whether palpation is more informative than cross arm test in diagnosing chronic acromio-clavicular joint pain (ACJ). This study used high resolution ultrasonography (HRU) as gold standard to confirm the findings of clinical examinations in patients presenting with chronic painful shoulder of multiple etiology.

Methods: It is a non-interventional prospective observational study. The physicians performing the clinical shoulder examinations and those performing sono imaging were blinded to the results each made.

Results: There were 73 patients, 35 males and 38 females whose mean age was 47.6 ± 11.51 years (range 22-80 years). Of them 36 patient had AC joint affection. Cross-arm test (CAT) showed sensitivity of 86.1 %, specificity of 91.9 %, positive predictive values of 91.9%,negative predictive value 87.2 %, positive likelihood ratio 10.63, negative likelihood ratio 0.15, Cohen's κ coefficient 0.781. Probe palpation tenderness showed sensitivity of 100 %, specificity of 67.6 %, positive predictive values 75 %, negative predictive value 100 %, positive likelihood ratio 3.09, negative likelihood ratio 0, Cohen's κ coefficient 0.673. Both the CAT and Probe tenderness showed strong correlation with a Pearson coefficient of 0.782 and 0.712.

Conclusion: Cross arm Test is the most rational singular choice of test to be performed with confidence and it has better validity than probe palpation in diagnosing chronic painfully restricted shoulder with acromio-clavicular joint pathology.

Keywords: Cross-Arm Test, Palpation, Acromio-clavicular joint pathology.

Introduction

High resolution ultra-sound (HRU) is increasingly used in diagnosing musculoskeletal conditions as results are comparable to magnetic resonance imaging^(1,8). Patients suffering from shoulder condition forms a substantial burden. HRU forms a cost effective, quick and objective way of diagnosing condition. This is particularly of help in delineating multiple etiologies which masquerades under painful and restricted .Such often used terms used to describe painful restricted shoulder are chief complains and has limitations in structurally defining the condition. Cross arm test is having one of the greatest sensitivity among various test to detect acromio-clavicular dysfunction^(2,3). Simple palpation also shown to have the most sensitivity in diagnosing AC joint dysfunction⁽¹²⁾. However there is no study comparing the test with simple probe palpation using HRU which justified an enquiry.

Aims and Objective

Correlation between clinical and sono finding
Determine sensitivity and specificity of clinical test

Patients and Methods

Study period was from month of July 2016 to September 2016. Study was passed by Institutional ethics committee. Study enrolled 77 consecutive screened adult patients with unilateral shoulder pain of greater than 3 weeks pre-diagnosed by local anesthetic injection visiting Physical medicine & rehabilitation dept of RG Kar Medical College, Kolkata, India. The diagnosis was not revealed to investigators. All these patients conformed to study criteria. Exclusion criteria were shoulder pain less than 3 weeks, fractures and suspected labral lesions, neural lesions, prior shoulder joint surgery and prior shoulder injection (local anesthetics or steroids) in the past 3 week. Patient included were those that mapped pain within an area bounded by the midpart of the clavicle and the deltoid insertion .All patients went through a routine

clinical and sono examination performed by two different investigators who were blinded. Informed consent was taken from all participants. The study was performed according to good clinical practice and carried out in compliance with the Helsinki Declaration. For HRUS examination we adhered to credible books journals and guidelines^(3,4,5,6,7,12,13). The HRUS examination was performed by senior faculty at the department. A senior physiatrist with an extensive experience of intervening under sono-guidance in over 1000 musculo skeletal with over 5 years of musculo-skeletal sono-experience was designated as the other investigator .Sono examination were performed with Edan DUS 3 Digital Ultrasonic Diagnostic Imaging System using a linear 7.5 MHz central frequency transducer L741 probe. Sonological examination was performed in coronal plane with arms in neutral position by liberal use of conducting jelly. Tenderness was elicited by a separate trainee post-graduate student by pressing the probe coronally in maximally visualized section patient's expression was subjectively noted according to faces pain scale⁽¹⁴⁾. The trainee did not disclose his finding either to sonographer or clinician recruited for the study. Clinical examination was carried out by one trained clinician (Physical medicine and rehabilitation post graduate trainee). Each examiners and examinee were blinded and did not know of each examiners finding. After test was completed independently a third consultant communicated finding to the patient throughout the study period. The tests included in the clinical examination were:

- Cross Arm Test;
- Acromio-clavicular (AC) joint palpation;

Data describing the results of the test and palpation were dichotomous. Each test having two option of being either positive or negative.

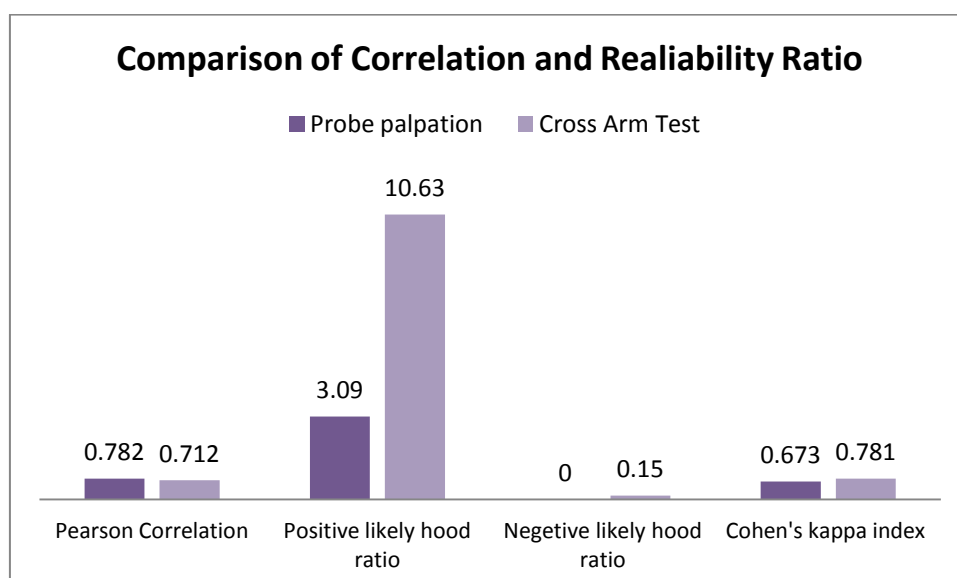
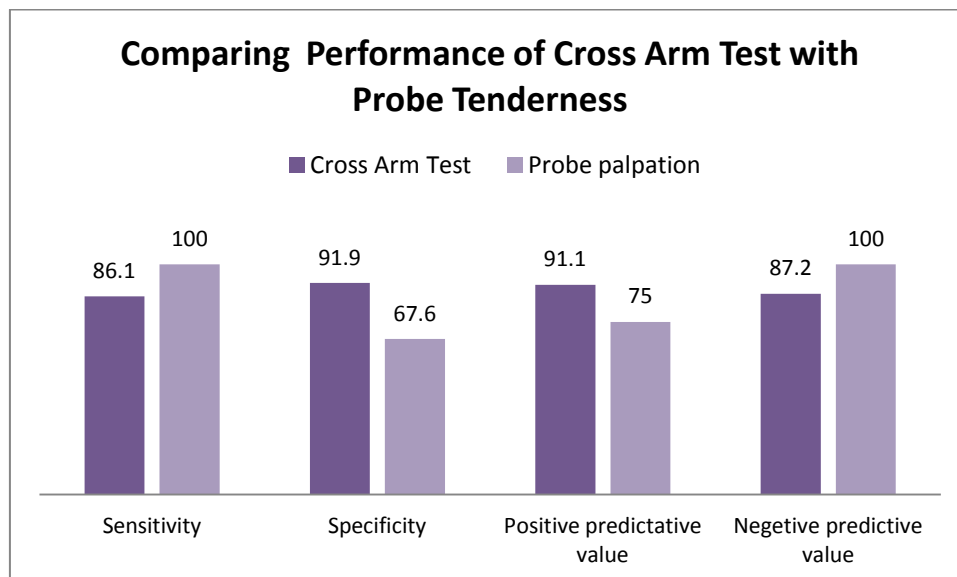
Results

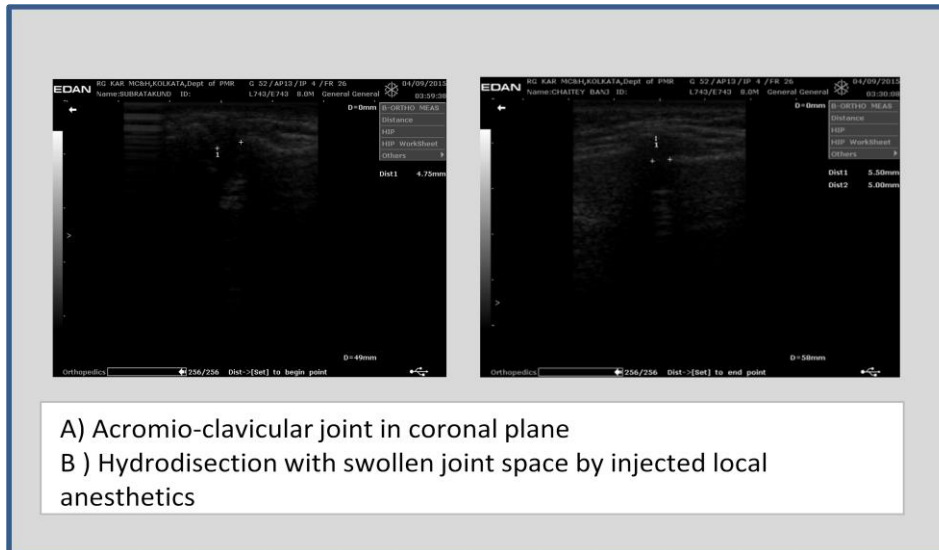
For statistical purpose SPSSv20 and Microsoft Office Excel 2007 was used .In our study sensitivity and specificity of selected clinical tests

for the assessment of chronic painful restricted shoulder are determined using HRUS as the gold standard. Empirical Pearson’s correlation coefficient was used as an indicator of linear dependence between the two variables (clinical examination test results and HRUS examination findings respectively). In order to measure the correlation in terms of inter-rater agreement, the Cohen’s κ coefficient was used.

There were 73 patients, 35 males and 38 females whose mean age was 47.6 ± 11.51 years (range 22-80 years). Of them 36 patient had AC joint affection. Cross-arm test showed sensitivity of 86.1 % , specificity of 91.9 % , positive predictive values of 91.9%,negative predictive value 87.2 % , positive likelihood ratio 10.63, negative likelihood

ratio 0.15, Cohen’s κ coefficient 0.781. Probe palpation tenderness showed sensitivity of 100 % , specificity of 67.6 % , positive predictive values 75 % , negative predictive value 100 % , positive likelihood ratio 3.09, negative likelihood ratio 0, Cohen’s κ coefficient 0.673 .Pearson Correlation of Cross Arm Adduction Test with USG findings for 73 patients is 0.782. It is a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive and magnitude of strength is strong ($.5 < |r|$). Pearson Correlation of Probe Palpation under HRU findings for 73 patients is 0.712. It is a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive and magnitude of strength is strong ($.5 < |r|$).





Discussion

The first novelty of study is in using HRU as gold standard vs. the tendency of using surgery and MRI to confirm a diagnosis. This makes such investigation non-invasive, cheap and reproducible with robust fecundity. It over comes limitation of surgical and invasive costly tools for validating clinical finding. It has been observed that there is a general trend among current practitioners of musculoskeletal HRU coming from various discipline to broadly agree regarding sensitivity and specificity data^(1,2,4,8,9,10). Our study partially agrees with such data with few variations.

Traditionally Cross arm Test in previous studies had high specificity and sensitivity (2, 3) which was replicated in our study result. Cross arm Test was found to be an ideal test only in isolated AC joint pathologies^(2,3). No previous study on palpation of AC joint to elicit pathology was noted. In various studies and study based literature we consulted used distal acromial excision surgery and local injection to confirm the singular diagnosis. With HRU we were able to get the diagnosis which was confirmed by local injection. In our study both the CAT and Probe tenderness showed strong correlation with a Pearson coefficient of 0.782 and 0.712 showing statistically significant linear relationship.

Previous publication showed cross arm test as having highest sensitivity 77 % and active

compression test having the highest specificity of 95 % for detecting AC joint lesions⁽³⁾. In our study simple palpation had maximum sensitivity with 100 % but specificity of palpation was lower than Cross arm Test in our study which stood at 91%. So simple palpation was maximally sensitive but it lacks specificity in situation where various shoulder etiology masquerades as painfully restricted shoulder. Cross arm Test in our investigation showed higher specificity then it showed in other studies or text. Having said that our high specificity of 91.9% for Cross arm Test didn't supersede even higher specificity of active compression test.

Since our test covered AC joint pathology with other concomitant shoulder pathologies results might have been affected. Especially supraspinatus which lies underneath the joint needs particular scrutiny in our future studies.

Conclusion

There are test for AC joint with most specificity, simple probe palpation is maximally specific however Cross arm Test with both sensitivity and specificity in high ranges naturally is the most rational singular choice of test to be performed with confidence in chronic painfully restricted shoulder. It was found to be reliable even in shoulder with multiple patho-anatomy other than AC joint.

Reference

1. Samira Saraya Rehab El Bakry
Ultrasound: Can it replace MRI in the evaluation of the rotator cuff tears? The Egyptian Journal of Radiology and Nuclear Medicine (2016) 47, 193–201.
2. Naredo E, Michael W O'Dale, C David Lin, J. Ricky Sing, George C. Christolias (2016) 'The Physiatric History And Physical Examination', in David X. Cifu (ed.) *Braddom's Physical Medicine & Rehabilitation*. Philadelphia: Elsevier, pp. 20.
3. Efstathios Chronopoulos, Tae Kyun Kim, Hyung Bin Park, Diane Ashenbrenner, Edward G. McFarland (2004) 'Diagnostic Value of Physical Tests for Isolated Chronic Acromioclavicular Lesions', *Am J of Sports Med*, Vol 32(Issue 3), pp. 655–661.
4. Raphael Micheroli Correlation of findings in clinical and high resolution ultrasonography examinations of the painful shoulder *Journal of Ultrasonography* 2015; 15: 29–44.
5. Ian Beggs, UK Stefano Bianchi, Switzerland Angel Bueno, Spain Michel Cohen, France Michel Court-Payen, Denmark Andrew Grainger, UK Franz Kainberger, Austria Andrea Klauser, Austria Carlo Martinoli, Italy Eugene McNally, UK Philip J. O'Connor, UK Philippe Peetrons, Belgium Monique Reijnierse, The Netherlands Philipp Remplik, Germany Enzo Silvestri, Italy (2016) *Musculoskeletal Ultrasound Technical Guidelines I. Shoulder*, Available at: <https://essr.org/content-essr/uploads/10/shoulder.pdf> (Accessed: 2016).
6. Backhaus M, Burmester GR, Gerber T, Grassi W, Machold KP, Swen WA *et al.*: Guidelines for musculoskeletal ultrasound in rheumatology. *Ann Rheum Dis* 2001; 60: 641–649.
7. Stefano Bianchi, Carlo Martinoli (2012) 'Shoulder', in Bianchi, Martinoli (ed.) *Ultrasound of the Musculoskeletal system*. India: Springer, pp. 190–330.
8. Samira Saraya Rehab El Bakry Ultrasound 'Can it replace MRI in the evaluation of the rotator cuff tears?' (2016). The Egyptian Journal of Radiology and Nuclear Medicine 47, pp 193–201.
9. Leroux JL, Thomas E, Bonnel F, Blotman F 'Diagnostic value of clinical tests for shoulder impingement syndrome.' (1995) *Rev Rhum Engl Ed*; 62: pp 423–428.
10. Iagnocco A, Coari G, Leone A, Valesini G 'Sonographic study of painful shoulder'. (2003) *Clin Exp Rheumatol*; 21: 355–358. 16.
11. Aguado P, De Miguel E, Uson J, Mayordomo L, Gijon-Baños J *et al.* (2002), 'Painful shoulder: comparison of physical examination and ultrasonographic findings.' *Ann Rheum Dis*; pp 61: 132–136.
12. Walton J1, Mahajan S, Paxinos A, Marshall J, Bryant C, Shnier R, Quinn R, Murrell GA. (2004) 'Diagnostic values of tests for acromioclavicular joint pain.', *J Bone Joint Surg Am.*, Apr(86-A(4)), pp. 807-812.
13. Stefano Bianchi, Carlo Martinoli (2012) 'Shoulder', in Bianchi, Martinoli (ed.) *Ultrasound of the musculoskeletal system*. India: Springer, pp. 232-234.
14. RN Dorothy, J. Stuppy. (May 1998) 'The faces pain scale: Reliability and validity with mature adults', *Applied Nursing Research*, 11(2), pp. 84-89.