# Evaluation of Clinical Assessment Methods for Scapular Dyskinesis

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**Introduction**

This study assesses the inter-rater reliability and validity of 2 clinical assessment methods of categorizing scapular dyskinesis by observation, and quantifies the frequency of the asymmetry of bilateral scapular motion in injured and uninjured shoulders using 3D kinematic analysis.

The paper refers to a number of difficulties using clinical measures of scapular dyskinesis. Firstly the difficultly in observing the motion of the scapula beneath muscle and overlying tissues, secondly the fact that there are 3 rotational and 2 translational motions to observe, highlighting the challenges present in establishing a clinical assessment criteria to define scapular dyskinesis.

**Methods**

The study population included 21 asymptomatic subjects and 35 symptomatic shoulder pain subjects. The symptomatic subjects were patients of one orthopaedic surgeon. All were assessed by the surgeon and subjects were excluded if they presented with bilateral should pain, previous fracture of the scapula, humerus or clavicle, and history or evidence of injury to the long thoracic spinal accessory or cervical root nerve. The asymptomatic subjects were recruited from a convenience sample from the local community and had no pathology in either shoulder. Two blinded assessors performed the assessment independently on each subject. They observed the medial and superior scapular borders during 3 to 5 trials of arm elevation in the sagittal and scapular planes. For the first part of the assessment 4 types of scapular dyskinesis were described – 3 abnormal patterns and 1 normal. In the second part of the clinical assessment 2 types were described (yes/no) – 1 normal and 1 abnormal. Subjects were also tracked with a 3D electromagnetic tracking device which had proven reliability (intraclass correlation coefficient ranging between 0.77-0.90). The paper described the normal and abnormal threshold values for the 3D kinematic analysis and described the statistical analysis used.

**Results**

For the 4-type clinical assessment an inter-rater reliability of 61% was described (κ correlation 0.44 ($P<0.1$)). The 2-type clinical assessment had a 79% agreement (κ correlation 0.41 ($P<0.1$)). When compared to the 3D analysis the overall accuracy of the 2 methods ranged from 45% to 66%. The sensitivity of the 4-type method varied across the types of scapular patterns, ranging

from 10%-54%, and the specificity ranged from 62% to 94%. The 2-type method resulted in sensitivity ranging from 74% to 78% but decreased specificity from 31% to 38%. The overall prevalence of scapular asymmetry in any plane was not different for the symptomatic or asymptomatic groups.

**Conclusion**

The paper concluded that the results show that the 2 type or yes/no method increased the inter-rater agreement and increased the sensitivity and positive predictive value over the original 4-type method but the reliability was not improved. As the prevalence of asymmetry in both asymptomatic and symptomatic populations was similar the paper raises the question of how to interpret a clinical assessment of altered scapular motion. It goes on to suggest that a 'no' asymmetry finding is helpful in ruling out dyskinesis as a contributing factor to shoulder pain. A 'yes' finding in the symptomatic shoulder would potentially assist in directing treatment.

**Review**

**Was there a clear question for the study to address?** Yes, the study addressed 2 clear questions

1) the inter-rater reliability and validity of 2 clinical assessment methods of categorizing scapular dyskinesis
2) quantifing the frequency of the asymmetry of bilateral scapular motion in injured and uninjured shoulders using 3D kinematic analysis.

**Was there a comparison with an appropriate reference standard?** Yes – 3D motion analysis was used in comparing scapular motion in symptomatic and asymptomatic groups in both symptomatic and asymptomatic shoulders. This device has proven reliability (intraclass correlation coefficient values ranging between 0.77-0.90).

**Did all patients get the diagnostic test and the reference standard?** Yes

**Could the results of the test of interest have been influenced by the results of the reference standard?** No - The clinicians were blinded and performed independently.

**Is the disease status of the tested population clearly described?** Yes – there was clear indication of the overall diagnoses as determined by clinical examination and imaging. There were also clear indications of the exclusion criteria. However, the presenting symptoms (other than shoulder pain) were not described nor were the severity or stage of disease identified.

**Were the methods for performing the test described in sufficient detail?** Yes

**What are the results?** The results are presented with reliability and specificity and sensitivity values and are easy to work with. The results for the 4-type clinical assessment an inter-rater reliability of 61% was described (κ correlation 0.44 ($P<0.1$)). The 2-type clinical assessment had a 79% agreement (κ correlation 0.41 ($P<0.1$)). When compared to the 3D analysis the overall accuracy of the 2 methods ranged from 45% to 66%. The sensitivity of the 4-type method varied across the types of scapular patterns, ranging from 10%-54%, and the specificity ranged from 62% to 94%. The 2-type method resulted in sensitivity ranging from 74% to 78% but decreased specificity from 31% to 38%. The overall prevalence of scapular asymmetry in any plane was not different for the symptomatic or asymptomatic groups.

**How sure are we about these results?** Yes they give the range of results in all planes but there are no confidence intervals. They also do not present the likelihood ratios for the tests.

For the yes/no assessment method of scapular dyskinesis the positive likelihood ratio for flexion is 1.2. Given the prevalence (pretest probability) of scapular asymmetry in any plane in flexion is 71% and the positive likelihood ratio of the yes/no assessment method is 1.2, the posttest probability is 70%. This would mean if the test gives a positive result there is no change in the probability that the patient has scapular dyskinesis. Is this test therefore of any use?

**Can the results be applied to your patients / population of interest?** Yes the patients appear to be varied across many 'typical' shoulder conditions seen in daily HSE populations. However, the results are unconvincing seeing that asymmetries are equally present in symptomatic and asymptomatic groups, thus questioning the benefit of using the test in clinical practice.

**Can the test be applied to your patient or population of interest?** Yes this is a cost free, risk free test and using the 2-type yes/no assessment does not require a large level of skill to apply.

**Were all outcomes important to the individual or population considered?** The knowledge of the results may help decision making but given it raises an important question i.e. how do we interpret a clinical assessment of altered scapular motion due to the prevalence of asymmetries in asymptomatic and symptomatic populations, it may raise more questions than answers.

**What would be the impact of using this test on your patient/population?** In the 2-type or yes/no to dyskinesis pattern it is likely that a 'no' result to scapular dyskinesis can be helpful in ruling out dyskinesis as a contributing factor to shoulder pain. A 'yes' finding in the symptomatic shoulder would potentially assist in directing treatment.