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Inter-examiner reliability of a test battery for assessing scapular positioning and function

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AIM

Abnormal scapular positioning and function is often present in subacromial impingement syndrome potentially leading to OA in the glenohumeral joint.

Though, which tests to use for identifying scapular positioning and function is unknown.

The aim was to investigate the inter-examiner reliability of an extended battery of clinical tests for assessing scapular positioning and function.

CONCLUSION

Within the static assessments of scapular positioning and function, four of the eight tests had intra-class correlation coefficients (ICC) values within “good to excellent” and no systematic bias.

Improvement of clinimetric properties of tests for measuring scapular dyskinesis are needed.

RESULTS

A total of 41 subjects (23 males, yrs 25±9) were recruited among overhead athletes.

Bland and Altman plots showed no funnel effects. Systematic bias were present in ten of the assessment methods (marked by an [a], Table 1), however, all within the range of the minimal detectable change (MDC).

ICC values ranged from “fair to good” (n=2) and “good to excellent” (n=6) in the static and supplemental assessment methods, and from “poor” (n=3) to “fair to good” (n=4) in the semi-dynamic assessment methods. Kappa values ranged from “poor” (n=4) to “fair to good” (n=3) in the dynamic assessments and no statistics could be computed in three tests due to constant measurement from one of the testers.

No systematic bias in addition to “good to excellent” ICC values were found in four of the static assessments only.

Table 1: Clinical assessment methods	**Kappa (95% CI)**	**Agreement (n=41)**	
Dynamic			
Winging scapula, at rest (yes/no)	0.31[a] (-0.03-0.39)	33/41 (81%)	
Winging scapula, arm extension with/without weight) (yes/no)	0.65[a]-0.71[a] (0.41-0.92)	34-35/41 (83-85%)	
Observational clinical evaluation of scapular positions (yes/no)	-0.34-0.47[a] (-0.29-0.75)	31-41/41 (77-100%)	
Semi-dynamic	**ICC (95% CI)**	**95 % LOA**	**MDC (%)**
Initial scapular movement (°)	0.47 (-0.02-0.71)	(-18.44; 15.58)	17.01 (25.4)
Scapular upward rotation (°)	0.25-0.70[a] (-4.00-0.84)	(-19.22; 13.94)	4.59-13.80 (29.1-85.2)
Proprioception/reposition (cm)	0.68 (0.39-0.83)	(-11.68; 13.81)	12.75 (99.9)
Static			
The modified Lennie test (cm)	0.71[a]; 0.80 (0.46-0.89)	(-2.92; 1.67)	1.84-2.11 (21.1-23.2)
Lower horizontal distance, at max arm flexion (cm)	0.89 (0.79-0.94)	(-1.99; 1.93)	1.96 (10.1)
Acromial distance (cm)	0.82; 0.93 (0.68-0.95)	(-4.10; 3.58)	2.90-3.84 (42.6-49.6)
Max passive internal rotation (°)	0.53 (0.11-0.75)	(-22.64; 27.54)	25.09 (15.5)
Supplemental assessment			
External shoulder rotation strength (kg) (with/without scapular fixation)	0.95[a]; 0.96[a] (0.91-0.98)	(-43.31; 19.67)	27.62-29.30 (25.0-26.7)

[a] Systematic bias, *ICC* intraclass correlation coefficient, *CI* confidence interval, *LOA* limits of agreement, *MDC* minimal detectable change, *kg* kilo, *CM* centimetre, *(°)* degrees

METHODS

A standardized three-phase protocol for clinical reliability studies was conducted with a training, an overall agreement and a study phase.

Subjects were allocated into two groups by the criteria (yes/no) of presence or not of a clinical evaluation of scapular asymmetry. Prevalence of the index condition was 54 %.

A total of 24 clinical assessment variables were distributed into three categories of assessment methods; static (6), semi-dynamic (7) and dynamic measurements (9) of the scapular positioning and function, besides assessment for external rotational strength (2) (Figure 1).

Bland and Altman plots, ICC and kappa values were used to assess the inter-examiner reliability.

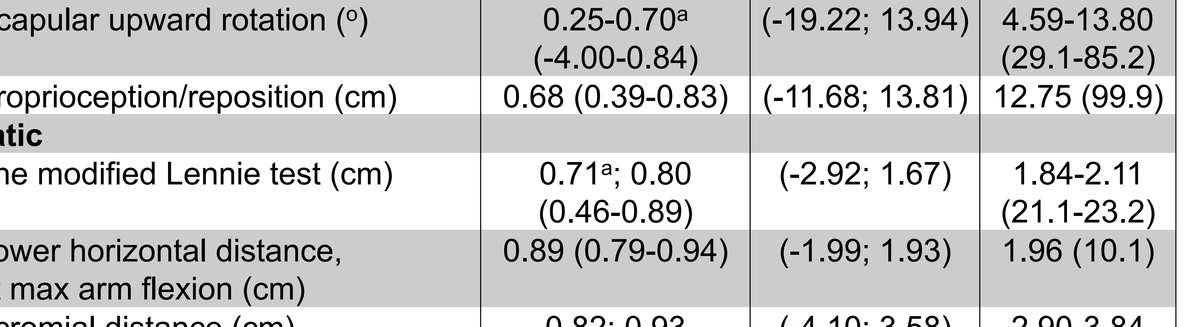

Figure 1: Examples of the three clinical assessment methods.

A: Static positioning assessment (distance from inferior angle to nearest spinosus process)

B: Semi-dynamic positioning assessment (upward rotation with the use of inclinometers)

C: Dynamic functional assessment (visual observation of scapular movement)

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