Author's response to reviews

Title: Interrater reliability of clinical tests to evaluate scapulothoracic motion

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Version: 2 Date: 10 July 2013

Author's response to reviews: see over
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Version: 2 Date: 9. Juli 2013

Author’s response to reviews: see over
Dear Dr Barbe, Dear Mr Aldea

Thank you very much for considering our manuscript for publication in your journal.

We greatly appreciate the thorough review and have subsequently edited the above manuscript according to your reviewers' recommendations and comments. In this cover letter we have given our response (blue) and changes (blue and italic) to every point brought forward. Changes to the manuscript are marked blue in the revised version. The correction of written English has been edited by a native English speaking colleague and is marked red in the revised manuscript.

Thank you for this opportunity to improve our manuscript and hope that our edits are satisfactory.

Evelyn Baertschi
Reviewer 1

Title: Interrater reliability of clinical tests to evaluate scapulothoracic motion

Version: 1 Date: 22 May 2013

Reviewer: Stephanie Muth

Reviewer's report:

Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore)

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. First sentence of methods: the number 39 needs to be spelled out.
   Change made as indicated by the reviewer.
2. Second sentence of methods: remove “a” prior to “passive shoulder flexion”
   Change made as indicated by the reviewer.
3. Second sentence in PROCEDURES: physiotherapist should be singular, not plural, followed by “who”
   Change made as indicated by the reviewer.
   Change made as indicated by the reviewer.
5. Seventh sentence in PROCEDURES: address assessed visually instead of which a goniometer
   The following sentence and citations has been added:
   “This method showed substantial to perfect intra- and interrater reliability of cervical range of motion [29].”

RESULTS:

1. sentence: Patients presented “with”...
   Change made as indicated by the reviewer.
2. Fourth sentence: spell out number 9
   Change made as indicated by the reviewer.

DISCUSSION:

1. Third sentence: Kappa values...were fair to substantial
   Change made as indicated by the reviewer.
2. Third to last sentence in first paragraph: assessed “scapular motion”...
   Change made as indicated by the reviewer.
3. Last sentence in first paragraph: Use third person language only
   Change made as indicated by the reviewer.

Major Compulsory Revisions

1. Second paragraph, third sentence of BACKGROUND: Scapular kinematics associated with impingement are quite variable. (See Ludewig, Reynolds, JOSPT, 2009; and McClure et al for deeper discussion of scapular kinematics and relationship to impingement. Should also consider Karduna et al... regarding the effects of scapular kinematics on subacromial space
We have revised this BACKGROUND paragraph:

“However, a correlation between decreased scapular upward rotation and glenohumeral instability has been demonstrated [3, 9, 10]. Furthermore, it is generally believed that reductions in scapular upward rotation and posterior tilt during arm elevation could contribute to subacromial impingement by reducing the available subacromial space [3, 5, 11-14]. Contrary to this, another investigation showed an increase of the subacromial space with reduction of scapular upward rotation [15]. Conflicting results are also found in the direction of scapular motion alterations in shoulder impingement [3]. The numerous methods of recording scapular motion, the variation in movement patterns in subjects and the investigation of scapular motion in different static positions or variations of shoulder elevation might have contributed to this variability of findings.”

2. Citation 16 in last sentence of third paragraph in Background – is this a peer reviewed citation? Recommend including additional citations to verify this statement

The sentence has been changed as followed:

“He observed the following disorders in patients with a slightly restricted shoulder: subacromial impingement, coracoclavicular compression, excessive torsion in the acromioclavicular joint and a tendency towards glenohumeral instability [16].”

3. First sentence of fourth paragraph – The tests being assessed will not identify shoulder disorders. They will only identify altered scapular motion

“shoulder disorders combined with“ has been deleted

4. First sentence after bullet points in EXAMINATION: operationally define scapular motion restriction

The following sentence has been added:

“A decreased scapular upward rotation, posterior tilt and external rotation, combined with altered motion of the clavicle and the cervicothoracic junction was defined as a restriction of scapular motion.”

5. Last sentence of Test 1 description in EXAMINATION: Recommend peer reviewed citation to describe reliability of Test 1. Reliability and validity of this test is crucial to purpose of this paper.

The sentence has been changed as followed:

“Stenvers [20] and de Wijer [21] suggested the dorsal axillary hair borderline as a reliable measuring point for the position of the scapula at the end of flexion.”


The paragraph has been changed as followed:

“Afterwards the clavicle continues to move cranially and posteriorly and finally caudally (ellipsoid path) [22]. Other studies describe posterior rotation, retraction and minimal elevation of the clavicle during normal elevation of the arm [23, 24].

The investigator passively moves the patients’ arm to approximately 60° of shoulder flexion. By means of palpation the clavicular motion is assessed simultaneously.”
A decreased rotation can be observed, as well as the following pattern: the clavicle is moving posteriorly already in the beginning of the movement and later in a dorsocranial direction (Figure 1, F) [22]. Thus, the palpating finger is pushed out of the supraclavicular fossa. Another study found increased clavicular elevation and retraction during shoulder flexion in subacromial impingement [25]."

7. Last sentence under Test 4. Recommend additional citations addressing the association between cervical motion and gh motion
   Additional citation has been added as suggested.

DISCUSSION:
1. Last sentence of second to last paragraph: need to explain and provide evidence to support this statement
   The following paragraph has been deleted:
   “Furthermore, it has to be noted that there is a difference between patients and controls (Table 1). The mean age of patients was higher and they complained more of pain (other than shoulder) than the controls. In addition controls included more women. However, we think that these differences have not affected interrater reliability.”

CONCLUSION:
1. First sentence: Based on the results of this study, it can be stated that the tests demonstrate interrater reliability. Validity needs to be established before they can be recommended as an appropriate clinical tool
   Conclusion has been changed as followed:
   “Our study demonstrates that the four mobility tests of the shoulder are a reliable and simple instrument in the assessment of patients with a slightly restricted shoulder flexion.”

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests: I have not competing interest
We have changed the description of the clinical tests and the figure legend as followed:

**Test 1: Scapular axillary hair test at the end of flexion**
Stenvers [20] and de Wijer [21] suggested the dorsal axillary hair borderline as a reliable measuring point for the position of the scapula at the end of flexion. The investigator passively moves the patient’s arm to the end of shoulder flexion. In this position the distance from the most lateral scapular point (crista margo lateralis inferior) and the vertical extension of the dorsal axillary hair borderline is determined.

**Negative:** If the most lateral scapular point is in the vertical extension of the dorsal axillary hair borderline, the test was rated negative.

**Positive:** If the determined distance was one finger width or more, the test was rated positive.

**Test 2: Clavicular movement during the first 60° of flexion**
During normal shoulder flexion the clavicle moves anteriorly during the first 60°. As a result space in supraclavicular fossa increases. Afterwards the clavicle continues to move cranially and posteriorly and finally caudally (ellipsoid path) [22]. Other studies describe posterior rotation, retraction and minimal elevation of the clavicle during normal elevation of the arm [23, 24].

The investigator passively moves the patients’ arm to approximately 60° of shoulder flexion. By means of palpation the clavicular motion is assessed simultaneously.

A decreased rotation can be observed in addition to the following pattern: at the beginning of the movement the clavicle moves posteriorly, followed later...
by movement in a dorsocranial direction (Figure 1, F) [22]. Thus, the palpating finger is pushed out of the supraclavicular fossa. Another study found increased clavicular elevation and retraction during shoulder flexion in subacromial impingement [25].

**Negative:** If the clavicle „stood still“ or a small fosse was formed for the palpating finger, the test was rated negative.

**Positive:** The test was rated positive, if the clavicle pushed the palpating finger cranially out of the supraclavicular fossa.

**Test 3:** Scapular posterior tilting during the last phase of flexion
The investigator passively moves the patients’ arm to the end of shoulder flexion. The scapula is palpated simultaneously.

**Negative:** If the inferior angle of the scapula moved caudal and anterior at the end of shoulder flexion, the test was rated negative.

**Positive:** If this movement could not be felt, the test was rated positive.

**Test 4:** Movement of the cervicothoracic junction during the last phase of flexion
During shoulder movement not only the scapulothoracic, the acromioclavicular, sternoclavicular and glenohumeral joints are involved, but also the cervical and thoracic spine. At the normal end of range flexion of the shoulder the cervicothoracic junction moves in extension, contralateral lateral flexion and ipsilateral rotation. There is a significant correlation between restriction of scapular motion and restricted movement of cervicothoracic junction [20, 26].

The investigator passively moves the patients’ arm to approximately 30° before the end of shoulder flexion. During passive end of range flexion (the last 30°) the spinal segments C7-T4 are palpated.

**Negative:** If an ipsilateral rotation of the spinous processes from C7-T4 could be palpated, the test was rated negative.

**Positive:** If this movement could not be palpated, the test was rated positive.”

**Figure 1.** Test 1-4

**A-D** Normal performance of the mobility tests of the shoulder. **E-H** Normal and abnormal performance

**E** Position of the most lateral scapular point at the end of flexion (left: normal, right: slightly restricted shoulder).

**F** Clavicular motion during flexion in normal shoulder movement (bold) and in a slightly restricted shoulder (not bold).

**G** Scapular posterior tilting during the last phase of flexion (normal shoulder movement).

**H** Movement of the cervicothoracic junction during the last phase of flexion (normal shoulder movement). **E-H** with kind permission of J.D. Stenvers (Stenvers, van Woerden & Kingma, 2011).

**Level of interest:** An article of importance in its field  
**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:** I declare that I have no competing interests