Author's response to reviews

Title: Range of shoulder motion in patients with adhesive capsulitis; intra-tester reproducibility is acceptable for group comparisons

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Author's response to reviews: see over
Responses to Reviewer Geert van der Heijden’s comments:

The title has been changed

1. Regarding diagnostic purposes: The sentence mentioned has been changed.

2a. Regarding clinical criteria and inclusion of patients: A short general description of the condition is given in the “Background” section of the revised version (last paragraph). The study was undertaken within the framework of a larger RCT project. Except for the inclusion period, inclusion criteria were the same for the ROM study as for the RCT study. In the revised version, we report all criteria used.

2b. Regarding selection of patients: Patients who could not comply with range of motion measurement procedures were not included in the study. This criterion was aimed and used for passive movements only. This has been clarified in the new version. Very few patients were excluded for this reason. The intention with having the criterion was to exclude patients that might suffer from a condition other than adhesive capsulitis. We feel that the issue has been adequately addressed in the “Discussion section” (p. 16).

2c. Regarding ROM and cut-off for inclusion: The cut-off level for inclusion reflects inclusion criteria reported in previous studies of patients with this condition. As pointed out by the Reviewer, the smallest difference in “true” passive ROM may have been only 10°, judging from reproducibility results and the cut-off level at 30°. This suggests that some of the included patients may have had very little restriction in passive ROM (Figure 6 indicates otherwise, though!). On the other hand, some patients with adhesive capsulitis may have been excluded because the criteria were too strict. Researchers probably have to accept problems of this type until “gold standard” criteria for the diagnosis have been established.

2d. Regarding compensatory movements: We have included the sentence “Test positions and poor fixation of scapular movements may result in compensatory movements and thereby increased variation of measurements, in particular for active movements” in the “Discussion” section (p. 14).

2e. Regarding symmetrical movements: Active ROM was not measured during symmetrical movements. This has been clarified (p. 9).

2f. Regarding combined ROM: Random error for each of the 4 different movements is not reduced, that is correct. We agree that in many settings the specificity of single-movement measurements is important, and a combined ROM measure would be inadequate. However, adhesive capsulitis is a condition that tends to restrict glenohumeral movement in all directions, and a simple quantification of overall ROM seems meaningful. Combined ROM can e.g. be used to define cut-off when including patients in trials, or some researchers may wish to use it to define “success” or not after a specific intervention.

3a. Regarding difference between observations: The second measurements do not indicate less restriction of ROM and the concept of regression to the mean does not seem to apply.

3b/c. Regarding statistical testing: Table 3 and related paragraphs have been deleted in the revised version of the manuscript. Other parts of the manuscript have been altered accordingly.
3d. Regarding acceptability of test-retest differences: See responses to Reviewer Dvir’s comments on the SDD.

3e. Regarding limits of agreement: We believe that information provided in the revised versions of Table 1 and 2 facilitate such evaluations.

Responses to Reviewer Zeevi Dvir’s comments:

5/6 and General.
Regarding combined movements: The sentence “Using single parameters to represent multiple movements may be unusual concerning shoulder ROM, but advantages with such parameters have been demonstrated when investigating motion in the cervical spine” and a reference are included in the revised version (Statistical procedures – first paragraph).

Regarding the use of the SDD concept: This is a reproducibility study where the SDD concept is employed in the usual way when reporting agreement between observations. However, we agree that reporting results according to a 95% probability level may be misleading. In many clinical settings it may be inappropriate to demand such confidence when demonstrating change. In the revised version, we also report the interval estimated to cover 90%, 80% and 50% of the differences between pairs of observations. We have also made some other changes in the manuscript to reflect this view concerning what lack of agreement should be viewed as acceptable. The Abstract is changed. In the “Statistical procedures” section we have removed the paragraph regarding criteria for acceptable measurement errors and in the “Discussion” section we have made some changes in the way we interpret our findings.

Regarding sample size: A sentence regarding sample size is included in the “Discussion” section of the revised version (first paragraph). Table 3 and related paragraphs have been deleted. The “Discussion” section in the revised version is less conclusive when interpreting results.

Regarding prevalence of the condition: The following sentence and a reference are included in the last paragraph in the “Background” section: “Adhesive capsulitis is a common cause of shoulder pain, estimated to affect 2% in the normal population”.

8. Regarding title: The title has been changed.