Reviewer's report

Title: Intraobserver and interobserver reliability of measures of cervical segmental angulation

Version: 1 Date: 30 April 2014

Reviewer: John Hipp

Reviewer's report:

This manuscript provides useful new data on the reliability of manual measurements of intervertebral motion. The manuscript as written is unclear in several areas. Revisions could substantially improve the manuscript. Several specific points are listed below and should be addressed:

1) In the background section, the first sentence about accuracy is correct. The second sentence might be changed to something like: “A reliable measurement should be both accurate and precise, with precision defined by agreement between different observers and agreement for an observer who repeats the measurement several times.” – the Wikipedia on this is concise – http://en.wikipedia.org/wiki/Accuracy_and_precision

2) The remainder of the manuscript should be changed to be consistent with accepted definitions of accuracy and precision. The word “accuracy” should not be used when it is precision that is being assessed.

3) In the background section, page 2, references should be cited for the statement “The steps used for the analysis of sagittal translation are well described.”

4) It is not clear how the section in the background regarding face validity and content validity relates to the question the author’s address in this manuscript. These topics are not addressed in the author’s study.

5) In the Measurement procedure section, please provide details for the software used. Please also state what levels were measured – just the degenerated level or all levels?

6) Please provide details on surgeon training and years in practice.

7) The last paragraph in the Measurement Procedure section is unclear. That entire paragraph could be removed, and simply refer to Figure 1 at the end of the sentence in the preceding paragraph that ends with “Method 1; Method 2; and Method 3.”

8) The authors should reference papers by Harrison et al that addressed a similar question with respect to alignment in a single x-ray: [1]

9) If the authors have access to software that calculates Bland-Altman statistics, a Bland-Altman analysis can provide data that are easier for a clinician to interpret, since it would inform readers as to the limits of agreement between readers. See a recent paper by Yeager et al[2]
10) The 1st sentence in the Results states that four measurement techniques were tested whereas only three are described.

11) In the results, the authors describe percent of measurements within 2 deg of the original measurement, but that statistic is not described in the methods. Note also that a 2 deg threshold is very high. Most computer-assisted methods have errors closer to 0.5 deg.

12) The instability criteria of greater than 11 deg was original intended to be used on a single static x-ray (eg one neutral-lateral X-ray), and a specific label was classified as unstable if the disc angle at that level was more than 11 deg different than the disc angle at adjacent levels.[3] The manuscript implies that levels were classified as unstable if there was > 11 deg intervertebral rotation between flexion and extension. Note that most of the asymptomatic population has > 11 deg of intervertebral motion at most levels.

13) In the results section, the authors state that method 2 was the most consistent method, whereas the discussion begins by stating it is the most variable and least reliable.

14) In the discussion, the authors should qualify the claim of being the first to examine reliability of intervertebral motion measurements from lateral cervical flexion extension x-rays. Multiple publications report on accuracy and reproducibility of computer-assisted measurements for intervertebral motion measurements in spine. [4-8] The manuscript addresses the reliability of manual line-drawing methods.

Reference List


noninvasive intervertebral motion measurements in the lumbar spine. JBiomechanics 38 (9):1943-1946


**Level of interest:** An article of importance in its field

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

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I am chief scientist for Medical Metrics which is a core research lab that provides intervertebral motion measurements from x-rays using computer-assisted methods. The author's manuscript will not have any effect on the Medical Metrics.