Reviewer's report

Title: The pendulum test as a tool to evaluate the passive knee flexibility, stiffness and viscosity of patients with rheumatoid arthritis vs control subjects: a pilot study.

Version: 1 Date: 15 September 2006

Reviewer: Barry Stillman

Reviewer's report:

General

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

ABSTRACT

1. Background: The average reader is likely to have a simple unsophisticated view of what constitutes joint “stiffness”. Accordingly, the authors need to clarify the difference in meaning between “flexibility”, “stiffness” and “viscosity”.

2. Method: Because I do not believe the average reader will know of the pendulum test, I recommend that a brief description of the test be included in the “Methods” section of this abstract. The authors might consider saying something like: With the subjects half-lying, the relaxed knee was dropped from near-full extension and the characteristics of the ensuing damped unsustained knee oscillation evaluated.

3. Background: Again it is necessary to indicate what “first knee flexion” and “first knee extension” are, and what the amplitude of these means — Is it the same as or different from measures of “flexibility”, “stiffness” and “viscosity”. Without reading the whole paper, the reader of the abstract will not understand the relationship between measures of “stiffness” and “viscosity” on the one hand, and “first flexion” and “first extension” amplitude on the other.

MAIN PAPER /BACKGROUND

1. Second paragraph: The average reader is likely to have a simple unsophisticated view of what constitutes joint “stiffness”. Accordingly, the authors need to clarify the difference in meaning between “flexibility”, “stiffness” and “viscosity”.

2. The author’s need to make clear in this paragraph, and with respect to Figures 2 and 5, that they are referring to the ARA classification of levels of severity of RA; where Stage 0 (Early RA) represents possible osteoporotic changes but no destructive joint changes on x-ray; stage 2 (mild RA) represents… and so on. Could the author’s insert a Table containing the criteria for Stages 0, 1, 2, 3 and 4 RA. Note that use of the word ‘Stadium’ is inappropriate in this context. The correct word is “Stage” (or ‘grade’, or ‘level’)

MAIN PAPER /METHODS /TESTING PROTOCOL

3. The sentence “Due to the inherent viscosity in the system… knee extensors” seems to have a careless use of the terms “viscosity”, “gravity” and “elastic forces”. It might be simpler at this stage to just say that the inherent viscoelastic properties of the joint and surrounding (predominantly muscular) tissues, coupled with the weight /mass of the moving foot and leg, cause the leg to finally come to rest close to the vertical position.

4. Second last sentence: Here the author’s indicate that the onset angle was ‘not fully extended’ in the RA subjects because of considerations of patient comfort. although it is made clear eventually (in the results) that there was no significant different between the onset angles of the patients and control subjects; it is important to indicate here in the methods section what angle of knee flexion (mean and SD) was used as the starting position for both subject groups. Otherwise the reader will think that the testing of the two subject groups was not comparable (at least with respect to onset angle).

MAIN PAPER /RESULTS

5. First paragraph: Given the small number of subjects, I believe a Table of results (mean and standard deviation values for initial angle, F1Amp, E1Amp, R1, etc, and the stiffness and viscosity measures) for the experimental and control group subjects is desirable. Also see 2. above regarding ‘Stadium’ and ‘Stage’.


6. Paragraph 5: The subjective capacity to judge “stiffness”, whilst itself not fully understood, does not make mechanical stiffness of rheumatoid and other joints controversial. The controversy regarding mechanical joint stiffness has to do with its nature, behaviour and measurement — which should be clarified by further research involving the pendulum and related tests. Since the pendulum test has nothing to do with perceived joint stiffness (the subject is never asked what do they feel during the test), the issues concerning the sense of stiffness are irrelevant to this paper. I suggest all references to the subjective estimation of stiffness be removed from the paper.

UNLESS the authors would like to suggest that the pendulum test results might form an interesting basis for the further study of the relationship between (types of) joint stiffness and perceived magnitude of stiffness.

7. Paragraph 7: This is the first paragraph in which reference is made to plasticity. The terms “friction” and “inertia” are also introduced in this paragraph. The authors need to introduce and differentiate between all these terms in the background section of the main paper. The reader should not be left to figure out what all these terms means.

The relationship between articular and periarticular contributions to stiffness also need to be more clearly explained (hypothesised).

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

ABSTRACT
1. Background /1st sentence: Remove ‘well known’ (The pendulum test is not a well-known throughout the world).

2. Results: Because the r^2 values are < 0.8, I believe they should only be characterised as being of moderate strength. Thus the third sentence should read: ‘A regression analysis showed that disease severity correlated moderately with stiffness (r^2 = 0.68) and first flexion (r^2 = 0.78).’

MAIN PAPER /BACKGROUND
3. first paragraph: Change sentence to read: ‘Furthermore, there is wide evidence of pathological modifications of muscle connective tissues…’

4. Second paragraph: Change sentence: ‘In this pilot study we approach this issue by means of the pendulum test of Wartenberg (4) which, until now, has been predominantly used to measure…’

MAIN PAPER /METHODS
5. Subjects /Paragraph 1: Indicate the criteria used to characterise the study group subjects as having RA. Simply saying “the presence of RA” is too vague.

6. Testing protocol /Second sentence: Change sentence to read: “After lifting the relaxed leg to a horizontal position, the examiner released the limb and let it fall and freely swing; into flexion, then extension, then flexion…”

7. Recording system: The sentence commencing “Given the coordinate data from markers,…” Should be changed to read: “The knee joint flexion-extension angles throughout the pendular movement were calculated from the reference marker coordinate data.”

8. Mechanical measurements and estimations /First paragraph /last line: Substitute “period of the first cycle (T)”.

9. Mechanical measurements and estimations /Following equation 1: change sentence commencing “where J is the sagittal movement of inertia…” to read: “where J is the sagittal movement of inertia applying to the leg-foot complex rotation around the knee axis”.

10. Statistical procedures /Second paragraph /last line: Use the term “Student’s t-test”

MAIN PAPER /RESULTS
11. Displacement parameters: Change sentence commencing “In the latter case the result…” to end as follows: “ oscillations detected in the patient group.”
12. First paragraph /Second sentence: Change sentence to read: “The analysis of limb oscillations... markedly reduced in these patients, coinciding with a significantly increased knee stiffness.”

13. Second paragraph /First sentence: Change this sentence to read: “Wartenberg (4) introduced... of testing tone (especially spasticity) of knee extensor muscles in patients with neurological diseases.”

14. Third paragraph /First sentence: Change this sentence to read: “Whilst the amplitudes of flexion and extension joint excursions are common... studies based on the Wartenberg test, a combination of the kinematic data with anthropometric data allows for the derivation of useful kinetic data.”

15. Paragraph 7 /Last sentence: Indicate that the observations of Johns and Wright apply to small healthy (eg, metacarpophalangeal) joints.

MAIN PAPER /CONCLUSIONS
16. Third sentence: Change sentence to read: “This test is simple and can be performed... motion systems, both of which have become increasingly available throughout the clinical environment.”

17. Fourth and fifth sentences should be changed to read something like the following: Furthermore, being a test under non-weightbearing conditions, the pendulum test is likely to less painful than weightbearing activities including walking and negotiating stairs.

18. Figure 1 legend: Spelling error “lateral malleolus”.

19. Figure 2 Legend: Change the word “Stadium” to “Stage”. Change “The period of one cycle” to read “The period of the first cycle”.

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

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

Statistical review: No

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