Reviewer's report

Title: Deviations in Gait Metrics in Patients with Chronic Ankle Instability. A Case Control Study

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Reviewer: Graham J Chapman

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Title: Deviations in gait metrics in patients with chronic ankle instability: a case control study.

This study aimed to show spatiotemporal differences in gait parameters between chronic ankle instability patients and age- and gender matched controls. I believe this study to be of interest to readers of the Journal of foot and ankle Research. However, at present there are a number of issues that need addressing (see below for specific comments).

Major comments

1. The stated aims of the study are inconsistent between the abstract and introduction. In the introduction, the authors aim to contribute to the understanding of the pathomechanics of CAI and allow for a more specific division of the condition into subgroups. I question to what extent the paper measures pathomechanics of chronic ankle instability given that the paper only reports spatio-temporal gait parameters. Furthermore, the aims read as though the current paper is going to sub-divide the cohort, which the paper does not. The aim(s) of the study need to be rewritten with a more realistic justification of why the study was conducted and hypotheses need to be included.

2. Justification of sample size for the study should be provided. Furthermore, if the study is age/gender matched, please can the authors explain why more healthy control subjects were included in the control group compared to CAI group? I would have expected to have the same number of subjects in each group.

3. No results have been presented on gender differences between the groups which have been reported in the statistical analysis section. Were there differences in gender between the groups? This information needs to be provided.

4. Similarly, the second part of the analysis attempted to correlate differences in self-reported health/function and gait parameters. A rationale justifying why this analysis has not been included in the aims of the study and the authors will need to add this into the introduction to justify its inclusion.

5. Affected limb is first mentions in the results section and ‘symptomatic’ in Tables 2 and 3. What is the definition of affected limb and/or symptomatic? Are these the same? How did you define the affected/symptomatic limb if patients had CAI in both limbs? Similarly, which limb did you test for the control subjects?
This information is needs to be included with the manuscript.

6. The discussion is poorly written. I do not feel as though the authors have attempted interpret their findings or related their findings to relevant past research. I do not see how the past research cited in the second paragraph of the discussion supports the current findings. Furthermore, I was surprised to read about postural control. Why do the authors feel that postural control literature is needed in this paper given that gait data is presented and not postural control data? Similarly, at the end of page 9, I was surprised to read that the authors stated the current findings support those of studies that described deficits in performance of strenuous stability i.e. jump test. Where is the link between gait and the cited past research? Overall, I feel that the discussion needs to be rewritten to link better with the introduction/aims but also for the authors to discuss their findings in relation to the purpose of study and relevant past research.

7. An increased base of support in the CAI group may imply a valid tool to assess deficits in this cohort. However, I feel this is premature to suggest such a tool, especially considering the author’s recognised limitations of the GaitMat system compared to 3D gait analysis when attempting to understand such a complex condition like CAI. Either this part of the discussion needs removing or the authors need to provide justification why they feel this should be kept in the manuscript.

8. Based on the above comments, I feel that the conclusions needs to rewritten to represent the paper rather than just stating what significant differences were found.

9. Given the recognised limitation of the GaitMat system, can the authors confidently say that through the present results, that potential new patient-specific treatment strategies can be found as stated within the aims?

Minor comments

1. Please keep the gait terminology consistent. For example, gait metrics and parameters are used interchangeably in the abstract.

2. A better definition of mechanical instability will allow the reader to fully understand what the authors are trying to portray.

3. Page 6, 4th line – ‘CIA’ should read ‘CAI’

4. First line, page 7 – a space is required before ‘stance’

5. In the results section, units of measure need to be included in the text.

6. The paper reports walking velocity is lower in the CAI group compared to controls. However, the number reported in text is different from that reported in Table 1. Please rectify.

7. Page 8, line 5 – respectively should follow p<0.002

8. Results show a reduction in SLS and an increase in DLS for the affected limb in the CAI group compared to controls. I do not understand how you can distinguish between limbs for DLS. Please explain this outcome.
9. In the discussion, ‘objective’ and ‘subjective’ terms are first introduced to the reader. Again, better use of terminology is required and a better effort at linking the introduction/aims to the discussion is needed.

10. The Rodriguez-Merchanin review of the literature showed a low reliability in effectively testing lateral ankle ligament laxity in a clinical setting. How? What did they show that has led to include this reference in your study?

11. In the limitations, the authors stated ‘they sought to define objective gait parameters….in clinical practice’. Similar to a previous point, this is the first time this has been mentioned in the paper and more effort is required linking the introduction/aims to the discussion to make this a more coherent paper.

12. In Tables 2 and 3. The confidence intervals should not have a hyphen between the numbers. Instead ‘to’ should be inserted.

13. At the bottom of Table 4, either a ‘(‘ needs inserting or the ‘)’ needs removing.

14. In Table 4, are the values r or r² values?

15. Does Figure 1 need to be included in the manuscript given that the results are reported in Table 2? Please can the author remove the figure or if keeping, remove the results from Table 2.

16. Use of the words such as ‘we’ and ‘they’ should be avoided.

**Level of interest:** An article whose findings are important to those with closely related research interests

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

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests