Reviewer’s report

Title: Coordination among the rearfoot, midfoot, and forefoot during walking

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Reviewer: Toni Arndt

Reviewer's report:

Review of the manuscript: "Coordination among the rearfoot, midfoot, and forefoot during walking."

JFAR-D-17-00029

General:

The manuscript presents a description of rear, mid and forefoot motion during walking using standard experimental methods based upon reflective skin markers and a previously described model of the foot. The modified vector coding technique is a new means of describing coordination between these three segments. The study was well performed and the manuscript is clearly written.

This reviewer has two concerns.

Firstly it is unclear why only 10 subjects were included. As this is a non-invasive experiment with little or no risk to the subjects, it would appear advisable to include more subjects to increase the statistical power of the results. If a power analysis had been performed and 10 subjects could be shown to provide sufficient power then this should be presented. If not a decisive argument why only 10 subjects were included is requested.

Secondly, the use of skin markers severely restricts the possibilities of describing relative motion of intrinsic foot segments. Differentiating between midfoot and forefoot motion is difficult as it is not certain the skin is representing what the underlying bones are doing. See specific point in methods below.

These issues need to be addressed for the manuscript to be considered for publication.
Specific:

Abstract:

L34-38: This is very vague and does not indicate that the authors have any concrete conclusions to draw from the study. What is a "more significant role"? It is obvious that the study contributed to the understanding of this coordination - but is that a conclusion? What is the purpose of comparing to patients with foot deformities?

The conclusion needs to be rewritten with concrete, concise facts.

Background:

L53: Here a study with bone-mounted markers is referenced, but there is no mention of what the study reported. Also the studies with bone mounted markers should be described in a more detailed description of the limitation of skin markers (see General points).

L87: Please clarify which study "the previous study" refers to. It is not clear whether this is 13 or 15.

Methods:

L105: See comment under General points concerning the low subject number.

L106: Please rewrite this sentence (in parentheses).

L109: Please state which review board this was.

L118: See General comments. It is positive that the validity and reliability are addressed, however the study by Leardini et al did not perform a validation. They did compare their results to those of an in vitro (cadaver) simulation of walking, which however has its own methodological problems. The model used in this study has therefore not been validated against the gold standard bone-pin method. This is a major limitation of this study and must be clearly addressed.

L130: Change running to walking.
Results:

The text describing the coordination patterns is very lengthy and repetitive, apart from different numbers. A suggestion would be to include the numbers in the graphs of figure 5 and remove all this text. Please consider this.

Discussion:

L309: Repetition; please correct.

L310: The study by Lundgren et al could be used as a comparison of many of the rotations presented here with a bonepin study. This would not be a real validation, but at least an indication of similar results.

L315: Remove text in parentheses - this reference has already been made.

L320: Why should these data be preliminary? If it is due to the low subject number then I suggest the data are not presented until more subjects are tested (see General point).

L340: Including only healthy subjects is not a limitation. These data are required for basic research knowledge with which future data can be compared.

L340: The major limitation that skin markers were used needs to be clearly presented and the potential effect on the results described. At present it is not even mentioned.

L344: Exactly. If the authors can not explain why only 10 subjects were included, they should test more before presenting this study.

Conclusion:

L360: Better conclusion here than in the abstract, but once again, what is a "more significant role"? Also the last sentence does not state anything useful.
Level of interest
Please indicate how interesting you found the manuscript:

An article of importance in its field

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

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