Reviewer's report

Title: Biomechanics of the Natural, Arthritic, and Replaced Human Ankle Joint

Version: 1 Date: 11 June 2013

Reviewer: Joseph Hamill

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All suggestions are Minor Essential Revisions

General Comments:
The paper entitled ‘Biomechanics of the natural, arthritic and replaced human ankle joint’ reviews previous literature pertaining to the biomechanics of the healthy, arthritic and replaced human ankle joint with specific focus on how this knowledge contributes to the development of effective ankle replacement techniques. The critical review of literature and the directions for future research provide functional information from which to build on knowledge in this area, and also provide a useful synopsis of existing research findings for surgeons and medical professionals. The review of literature is well structured and the manuscript is well written.

There is a general point and a few specific comments which I would like the authors to consider before publication.

The method by which the literature for review was found was not presented – was a specific search technique used?

Specific Comments:

Introduction:

P4 Sentence: ‘Muscles act by applying forces to all bones apart the talus...’, please clarify.

P4 Wording: ‘The lever arm lengths are measures ...’ consider replacing with ‘are associated with’

Review

P4 Wording: ‘...is the other primary requirement of joint replacement’ consider revising to ‘...is also a key requirement...’

P5 Sentence: ‘In the most severe such cases...’ add ‘of such cases’

P5 Define abbreviation CT on first use.

P6 Sentence: ‘...three anatomical planes were found to be...’

P6 Sentence: ‘This is a fundamental knowledge...’ remove ‘a’

P6 Sentence: ‘A rig was built..., minimum load, while joint motion was constrained...' so a suggested rewording by adding ‘while’ and ‘was’. P7 Sentence: full stop after (Figure 3).
P7 Sentence: ‘… maximised in dorsiflexion, and that of the extensor…’
P8 Sentence: ‘This was accounted for by the over simplification…….’ Also consider replacing ‘precisely’ with ‘precise’ in the next sentence.
Three-dimensional and 3D are used interchangeably throughout, please consistently use one or the other.
P8 Please add a reference for the last sentence of P8.
P10 Re-word the last sentence ‘These has been…’
P11 Consider changing ‘Status’ and ‘size’ to height and mass.
P11 Last 2 sentences of P11 over to P12: There is repetition of information across these two sentences; consider revising.
P12 ‘rear foot’ and ‘hind foot’ are used throughout, if they refer to the same anatomical structure consider using only one term.
P12 Sentence: ‘These systems are more practical…’ consider revising this sentence for clarity.
P12 Sentence: ‘However interesting preliminary studies are creating these methods into accessible…’
P13 The first paragraph of section 2.2.1 suggests consensus of opinion among the results of studies, however the second paragraph suggests disparities between the results of these studies. Please clarify.
P13 Sentence: ‘With respect to…’ remove ‘have above’
P14 Sentence: ‘in general, the removal or limited, …’ consider re wording the latter part of this sentence. In addition, please re word the last sentence of section 2.2.2.
P15 Sentence: ‘In explicit comparisons...’ ‘was’ to were and ‘remained' to remaining.
P16 Consider revising the opening sentence of section 3. In the opening sentence of section 3.1 consider replacing ‘about’ with ‘with’ x2.
P17 Re word the latter part of the second sentence of P17, section 3.1.1. Consider removing ‘much’ from the next sentence. To the sentence, ‘The current generation of three-part TAR designs are the only...’.
Later on P17, section 3.1.2, remove ‘for’ from sentence, ‘It is free to translate in any direction for the …’
P19 Sentence: remove ‘either’ and ‘both’ from sentence ‘Our mathematical analysis...’
Define abbreviation US on first use.
Conclusion
P20 Sentence: Consider revising the first sentence to read ‘…critically…’

Level of interest: An article of outstanding merit and interest in its field
Quality of written English: Acceptable

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

Declaration of competing interests:
I have no competing interests with this paper.