Author's response to reviews

Title: Analysis of knee flexion characteristics and how they alter with the onset of knee osteoarthritis: A case control study

Authors:

Diana Hodgins (dmh@etb.co.uk)
Ian McCarthy (i.mccarthy@ucl.ac.uk)
Amit Mor (amitm@apostherapy.com)
Avi Elbaz (avie@apostherapy.com)
Ganit Segal (ganitm@apostherapy.com)

Version: 2 Date: 2 April 2013

Author's response to reviews: see over
Dear Editor,

We submit to you our revisions to the research work: "Analysis of knee flexion characteristics and how they alter with the onset of knee osteoarthritis: A case control study"

Thank you very much for giving us the opportunity to resubmit the above-noted paper. We are grateful for the suggestions and comments of the reviewers, and we believe that the changes recommended have improved the quality of our submission.
Authors' answers to the reviewers:

Reviewer 1:

Major Compulsory Revisions

Specifically:

1. *What are the subject characteristics in terms of gender and BMI? Are there systematic differences given that all the OA patients were recruited in Israel while all the controls in the UK? These factors may explain some of the differences.*

Thank you for this comment. We have added information regarding gender distribution and BMI to the patients’ characteristics in the methods section. There were no significant differences in age between patients with knee OA and healthy controls. Significant differences between the two groups were found in BMI. The correlation between knee OA and higher BMI is well established, hence we do not believe these difference are due to location of recruitment rather a consequence of the disease.

Further to your recommendation, we have also added gender analysis to this manuscript: There was no significant difference in BMI between females and males with knee OA as well as between healthy females and healthy males. In addition, there was no significant difference in age between healthy females and healthy males. There was, however a significant difference in age between females and males with knee OA. This difference however is small and is not considered to affect the results.

Furthermore, gender analysis was also carried in order to examine whether the aforementioned significant differences in knee angles are related to gender. Similar trends were
found in both females and males with differences in knee flexion ROM during swing (P=0.006 for females, P=0.08 for males) and knee flexion ROM during stance (P=0.001 for females, P=0.02 for males). This suggests that gender was not a confounder to the results of this study.

The manuscript was revised accordingly.

2. What is the effect of confounders such as age, gender BMI ion the study? Given the small sample size it will not be possible to do multiple regression. However sub-group analysis where males only and females only are examined will be important. Clearly with the reduced sample size in each group the power will be reduced so the results may not be significant. However the direction and magnitude of the results should remain similar for males and females if gender is not a confounder.

Thank you for this comment. Please see our response to comment number one. We have included sub-group analysis to this manuscript and addressed confounders in the statistical analysis,

3. What is the effect of gait being performed on different machines at different sites? Could this in part explain the differences seen? This needs to be considered and evidence presented that this is not the main reason for the differences seen.

We have previously measured the reproducibility of the measurement system through repeat measurements on volunteers, and found this to be +/- 2.8° for knee ROM. This would have a very small effect on the group mean values presented in this manuscript. In addition, we have a comparison of young age-matched control subjects performed at the two sites, and found
no significant differences between parameters measured at the two sites; for example, knee
stance ROM means are 19.8 +/- 3.8° and 18.8 +/- 3.9°.

4. The above need to be discussed in the limitations and the potential effect of these on the
results considered.

The text has been amended to discuss the points raised by the referee.

Reviewer 2:

Major Compulsory Revisions

1. First paragraph in the Methods section

The characteristics of the knee OA patients selected for the study should be clarified,
especially the stage of knee osteoarthritis in their group, if the authors want to show the
alteration of the knee flexion during gait with "onset of knee osteoarthritis" as referred in the
title.

Thank you for this comment. As mentioned in the manuscript, we used Altman et al.
clinical classification for patients with knee OA as inclusion criteria for this study. This
classification is well-established and used in population with knee OA. We have added
information regarding the classification criteria.

In addition, patient's duration of symptoms was also recorded. We included patients with at
least 6 months of symptoms but not more than 24 months of symptoms. We have limited the
duration of symptoms in order to have a homogenous cohort of patients with early signs of knee
pain. This information was added to the manuscript.

- Minor Essential Revisions
1. *First paragraph in the Methods section and fifth paragraph in the Discussion section:* It is preferable to explain what abbreviation “the ACR” means.

The manuscript has been revised accordingly.

2. *First paragraph in the Protocol section:* Please explain the specific sites on which sensors were attached.

Thank you for this comment. A detailed explanation on sensor location has been added to the manuscript.

3. *In the Data analysis section,* “stride time (sec)” should be rewritten as “stride time (s)” according to the International System of Units.

The manuscript was revised accordingly.

4. *In Figure 4,* please write the unit (deg) in y-axis and identify what 1.00 and 2.00 in x-axis mean.

We have amended the figure legend to identify what 1.00 and 2.00 mean.

Sincerely,

**Corresponding author**

Dr. Ganit Segal