Author’s response to reviews

Title: Precision and Agreement of Higher Order Aberrations Measured With Ray Tracing and Hartmann-Shack Aberrometers

Authors:

Zequan Xu (xuzequan1986@sjtu.edu.cn)
Yanjun Hua (hyj1860@hotmail.com)
Wei Qiu (qiuei0828@126.com)
Guoqiang Li (gqli2000@yahoo.com)
Qiang Wu (qiang.Wu@shsmu.edu.cn)

Version: 1 Date: 18 Oct 2017

Author’s response to reviews:

Dear editor:

Thank you for your attention to the present manuscript. Here all the questions and comments from reviewers were replied in detail below.

1. Introduction. Page 4, line 13. I would remove the word "Recently", because wavefront sensors have been used already for clinical purposes for more than a decade (i.e. Zywave), as authors also state in the following sentence.

Response:

Thanks for your suggestions. We apologize for the improper expressing. Yes, it would be better if the word “Recently” is removed, and we corrected it as you suggested.

2. Methods. Page 5. Were rigid gas permeable contact lens users allowed participating in the study? It should be taken into account that these subjects usually show corneal warpage once the CL is removed, and they HOAs values might have influenced results at some point as only healthy subject without corneal anomalies were included. Likewise, which criteria were followed by authors to detect corneal ectasia patients?
Response:

We feel great thanks for your professional review. We apologize that we did not state them clearly. We agree that rigid gas permeable contact lens users usually show corneal warpage once the CL is removed, and they HOAs values might have influenced results, thus, we excluded rigid gas permeable contact lens users and soft contact lens users in our study, and we define rigid gas permeable contact lens user as wearing rigid gas permeable contact lens within 4 weeks, soft contact lens user as wearing soft contact lens within 2 weeks. And in our study actually, all subjects had no history of wearing rigid gas permeable contact lens or soft contact lens. Furthermore, as in our exclusion part of manuscript, we excluded patients who had history of ocular pathology which include corneal ectasia patients, besides, both the Topcon KR-1W system and the iTrace systems we used in our experiment has the function of corneal topography, thus observer who both are experienced ophthalmologist would detect corneal ectasia patients. Thank you again for your professional review.

3. Finally, authors stated that participants having subjective dry eye symptoms were excluded, which instrument was used to detect such type of patients?

Response:

Thanks for your professional review. We excluded dry eye patients because dry eye patients may be not well cooperated since patients should keep eyes open during the examination of the Topcon KR-1W system and the iTrace systems, and the examination usually lasts more than 10 seconds which is not easy for dry eye patients. And we define dry eye patients as: complaint of Dry eye syndrome (dryness, burning and a sandy-gritty eye irritation that gets worse as the day goes on) and tear film break-up time shorter than 5 seconds. We are sorry we fail to mention some details on subjects and methods part, each subject underwent slit-lamp examination to check tear meniscus, and the tear breakup time (TBUT) test was conducted provided the tear meniscus height was found be decreased. We already added these details on subjects and methods part.

4. Page 6, line 23. It seems that there is a spelling mistake: "Tetrofoil". Page 6, line 37.

Response:

The spelling mistake was corrected accordingly.

5. Reference 16 might not be the appropriate one. Authors stated that for obtaining precision and agreement they followed British Standard Institute (BSI) and ISO indications, however,
reference 16 is related to a study following BSI. It is always recommended to use the original source (i.e. BSI or ISO publications) as a reference.

Response:

Thanks for your reminding. We used the original source as a reference to replace the Reference 16.

6. Results. Bland-Altman graphs are constructed not only to assess the width of the LoAs, but also to graphically evaluate if there is any tendency for the difference to change as a function of the average of the variable assessed (i.e. total HOAs). It is clearly observed in the figures that for several HOAs (i.e. Figure 2, corneal SA), the differences between devices show a tendency to decrease with increasing HOA magnitude. And this finding should be also mentioned in the results section. Moreover, in those cases were the crude LoA value could be acceptable from a clinical viewpoint (authors determined a value \(<0.1\) microns), it is also recommended to mathematically assess if there is an association between the difference and average HOAs values. If so, authors should also apply the regression model previously described by Bland-Altman (Bland JM, Altman DG. Measuring agreement in method comparison studies. Stat Methods Med Res. 1999;8:135-160.)

Response:

It is right that the differences between devices show a tendency to decrease with increasing HOA magnitude in corneal SA as you mentioned in Figure 2, similar tendency is found in tHOA in figure 1, and trefoil in figure 3. We already added these findings in the results section as you suggested. Moreover, we tried the regression models as you suggested for the parameters which had association between the difference and average. Given the limited space of result section, we did not express them in detail. If you insist that it should be expressed in detail in the result or other section, we will consider to add it. However, we consider that Bland-Altman plots can express the distribution of the difference and average of 2 measurements directly. And it can help us, to some extent, to understand the agreement (good or not so good) of the 2 measurements in spite of the existing association between difference and average.

7. Discussion Authors should further discuss from a clinical viewpoint, the limitations that they stated regarding pupil diameter and / or ocular anomalies. i.e. Should we expect similar reliability HOAs values in highly myopic (or hyperopic) candidates seeking refractive surgery counseling or cataract surgery patients? Differences between devices should be much greater in healthy young individuals whose mean pupil diameter in mesopic conditions is usually larger than 6 mm? etc.
Response:

Thanks for your suggestion. Since we exclude highly myopic (or hyperopic) patients, thus we did not get conclusive results on whether we could expect similar reliability HOAs values in those patients. Likewise, we did not get conclusive results on whether differences between devices should be much greater in healthy young individuals whose mean pupil diameter in mesopic conditions is usually larger than 6 mm since we only referred to HOA measurements under the pupil of 4mm. Thus, future studies should be carried out to assess reliability HOAs values in highly myopic (or hyperopic) patients or referred to HOA measurements under the pupil of 6mm.

According to the reviewer’s comments, we have revised the manuscript extensively. If there are any other modifications we could make, we would like very much to modify them and we really appreciate your help. BMC ophthalmology is a journal of great popularity and prestige. We hope that our manuscript could be considered for publication in your journal. Thank you very much for your help.

Your sincere:

Qiang Wu