Reviewer’s report

Title: Goldmann and Error Correcting Tonometry Prisms Compared to Intracameral Pressure

Version: 0 Date: 19 Jul 2017

Reviewer: Giovanni Montesano

Reviewer's report:

The authors present a detailed analysis comparing two applanation tonometer prisms in terms of accuracy. Measurements from both devices have been compared to an invasive measure of the ocular pressure via cannulation. The experimental setup is thorough and the description of the methodology is accurate. However, I have major concerns, especially regarding the statistical analysis.

- Lines 116 - 125: instead of performing a post hoc power analysis it would be better to model the variability considering the intrasubject correlation of observations. Mixed models might be helpful in this context and should be considered, using random effects to model the correlations;

- Lines 193 - 201: the authors should specify what kind of modeling was used to study the correlation of the error with the intracameral IOP value. The graph suggests a curved relationship but no reference to a polynomial or any other kind of curved model is made.

- All CCT and CFR analysis: the authors are not addressing the main question with their correlation analysis. First, they calculate separate correlations for GAT and CATS and then, since they cannot find significant differences in neither of the two they attempt to show the difference with a t-test by dividing the range of the corneal parameters in two groups. It would be better to actually test the difference of the slopes between the two tonometers. This could be easily achieved by the use of linear models. In this case, two random effects (one for the subject and one for the eye to account for the repeated measures, the second nested in the first) should be used. The actual model should include the parameter of interest and a dummy factor indicating if the measure has been taken with a GAT or a CATS. Then, an interaction term between the two parameters would represent the difference in slope and could be tested. For example, for the CCT modeling the difference between the applanation and the intracameral IOP, the model would look like this (Prism is a dummy variable indicating the GAT or the CATS tonometer):

Difference = Intercept + Prism + CCT + Prism*CCT. Here I did not report the random effects (that MUST be included). The last term is the interaction that would test the difference in slope. The same could be repeated for the CFR and, possibly, for the true IOP to assess the different effects of these parameters on the error. Furthermore, a multivariate model with two way or three
way interaction terms could be used to assess the effect of all these parameters contemporarily (but this global model could be limited by the number of observations).

- It is not clear what the rationale for using cadaveric eyes is. From the methods, it looks like only three eyes have been used (since the main goal is stated to be the measurement of the test repeatability and reproducibility) but then in the Results it looks like all the eyes have been used. Please clarify these aspects.

- It is not clear where the cannula has been placed during surgery. This is important since it might affect the corneal properties (as opposed to the cadaveric eyes measurements where the cannula was implanted through the sclera). This limitation is noted by the authors in the discussion. Nonetheless it should be better explained in the methods.

Minor comment: the English language is overall correct but some typos are present and might limit the comprehension of the manuscript.

Line 75: "relavent" should be "relevant";

Line 102: "In mathematically modeling" should be "In mathematical modeling"

Line 174: "though" should be "through"

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

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