Reviewer's report

Title: Tono-Pen XL tonometry during application of a suction ring in rabbits

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Reviewer: John Danias

Reviewer's report:

This manuscript describes work that attempts to determine suitability of Tonopen for monitoring IOP during application of a suction ring device for performance of keratorefractive surgery. The authors report that Tonopen IOP measurements correlate well with manometric readings prior to application of the suction ring but have poor correlation after application of the device even when IOP is maintained at artificially low levels. They attribute this poor correlation to changes in the cornea induced by the suction ring. Although the experiments are generally well performed and logically organized, a number of points need to be addressed. In addition the manuscript would benefit significantly from editing by a native English speaker as certain sentences are hard to understand.

1. Abstract: Results need to be more explicit (see comment above). Last sentence in Conclusions is speculation and should be removed.

2. Background: Tonopen is an electronic tonometer and does not operate on the applanation principle.

3. Methods: How was corneal thickness measured?

4. Figures 1 and 2 are not needed as the text description is adequate

5. Results: Figure 3a should be re-plotted with the axes inverted (manometric IOP in the x-axis)

6. Normalized Tonopen error should be defined in the text and not left for the figure legend

7. A Figure showing the time course of IOP elevation and decay after suction ring application would be very useful and should be included.

8. It is unclear at which time point after application of the suction ring manometric measurements did not show change with increasing suction.

9. The rationale behind artificially setting IOP to 30 (and 60) mmHg is somewhat unclear. The authors should explain this point in more detail in the methods section. Also it is unclear how the authors lower the pressure. Do they apply a set manometric pressure when IOP has declined to that level (with time) or did opening the system by attaching an external reservoir cause the pressure to drop?

10. Figure 4b and 4e show Y axis title (Real IOP- Tonopen IOP)/Real IOP but values that seem not to be normalized. Is this a % value?

11. Inspection of curves of individual animals shows some animals with good
agreement between Tonopen IOP and true IOP and some with very poor correlation. Can the differences be explained by minor differences in the application of the suction ring?

12. Correlations like the ones performed in figures 4b and 4e should be interpreted cautiously as they are based on very few points. Also what is the reproducibility of pachymetry and how reliable is that data?

13. Discussion needs editing (for e.g. the authors use the word “inferior” on line 11 when they probably mean “less than”).

14. The comment on the range of Tonopen presumably means that Tonopen does not show IOP values above 90 and that is why the authors did not attempt to correlate manometric IOP with Tonopen IOP above this level. This is a serious and important limitation of the instrument for measuring IOP during suction application and supersedes all other results. Thus the data obtained under artificially low IOP during application of suction can only be used to try and understand Tonopen behavior and not to prove its usefulness or not.

15. The last sentence of the discussion is mere speculation and should be removed.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

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

Declaration of competing interests:

I declare that I have no competing interests