Author's response to reviews

Title: Prospective Study of Toric IOL Outcomes based on the Lenstar LS 900(R) Dual Zone Automated Keratometer

Authors:

Kjell G Gundersen (kggunder@gmail.com)
Richard J Potvin (rpotvinod@earthlink.net)

Version: 2 Date: 16 June 2012

Author's response to reviews: see over
Revision Notes:
Prospective Study of Toric IOL Outcomes based on Dual-Zone Automated Keratometry

We thank the reviewers for their time and helpful comments. As a result of the review the following requested changes have been made, or a rationale provided if not made.

Reviewer 1: Gabor Nemeth

1. The reviewer notes that preoperative refractive cylinder is not provided, which is correct. The crystalline lens is a source of refractive astigmatism and of course it is removed. The presence of a cataract may also cause difficulty with accurate refraction. As a result, the generally adopted comparator in this and other studies is preoperative corneal cylinder; the anterior cornea is the primary source of astigmatism after the lens is removed. Postoperative refractive cylinder is the outcome of most interest to the patient and surgeon.

2. The reviewer mentions a 6 month time frame but this was an error in the separately uploaded abstract. That has been corrected.

3. The author suggests SIA can be different by incision location, though this is still a subject of debate in the literature. However, we have added a comment that all incisions were superior, reducing any potential variability from incision orientation.

4. The author requests details on what vector tests were performed. There is only one correct method of vector analysis for astigmatism (though several implementations of the same method have been reported in the literature). We believe the language in the current text is appropriate.

5. The reviewer notes one anomalous case of SIA, which we point out. We have insufficient data to correlate to any preoperative factors, as there was nothing apparently atypical with the Lenstar reading or other routine pre-surgical data. We have made that point. As the reviewer notes, the issue of 'outliers' in the SIA is an important one and worthy of research. That was beyond the scope of this paper.

6. As recommended, we have removed the 7 cases that were not analyzed in the main group. Table 2 has been removed.

7. Stability of refraction is important, of course, but in the context of the present manuscript no long term follow-up was required. This remains another interesting research question. Postoperative refractive stability has been commented on by adding a statement about the vector change from 1 to 3 months (0.25 +/- 0.2D), which we would assert is inside the test-retest reliability of clinical refraction. The detailed calculations to demonstrate this is
randomly distributed around the 1M refraction is beyond the scope of the paper. Longer term results of toric IOL implantation in general may be discussed in a future paper.

Reviewer 2: Paul-Rolf Preussner (we apologize, we don't have the appropriate symbol...)

1. As noted above, the analysis is now restricted to the 43 uncomplicated eyes.

2. We agree with the reviewer and had adopted the previous language in order to avoid using a specific device name in the title. However, it did interfere with readability and had the potential for confusion with similar devices so we have reverted to "the Lenstar LS 900®" as the general descriptor in the paper.

3. We have clarified what the "standard deviation of the angle" is at an earlier point in the paper.

4. We fully agree with the reviewer that detailed analysis of astigmatism requires vector analysis and dual angle plots. However, this study was conducted to assess overall clinical outcomes rather than the specifics of those outcomes (which would be elucidated by the suggested vector analysis). There is no relative comparator. We submit that the post-operative refractive astigmatism data are the appropriate measure here. The vast majority of surgeons are interested in the expected refractive results, and we would contend do not easily assimilate dual-angle plots demonstrating vector astigmatism changes.

5. We have made a comment regarding the change in axis markings over the course of the study.

6. The reviewer comments on the limitations of the standard deviation of the axis of astigmatism. We agree that there can be challenges with such methods at the limit (where magnitude of astigmatism approaches zero, the axis will be a random number). The number, however derived, is a variable provided by the Lenstar device and can be used objectively to screen results. The determination of this number by the Lenstar device is beyond the scope of this paper. In the context of toric IOL planning a corneal astigmatism near zero (where the concern arises) is unlikely to suggest use of a toric IOL for correction, so the issue is self-limiting in the context of this paper. There is a comment in the article that the standard deviation of the angle does not vary by lens type (a proxy for astigmatism magnitude); we did not notice higher variability in the low-powered groups.