

Toric IOL refractive surprises

Understanding and considering all the available options is imperative

By Felicity Thomas

Reviewed by Dr Noel Alpíns

Consideration of all the available options should be made to correct refractive surprises, emphasized Dr Noel Alpíns (NewVision Clinics, Cheltenham, Victoria, Australia) when speaking during the 'Assessment of Astigmatism' session at the 2013 ESCRS Congress.

In his presentation, he discussed two cases to demonstrate how calculation of refractive surprises, using a new application of free internet software, can assist in the decision of which option to take to reduce or eliminate the remaining refractive cylinder. Here, we highlight the outcomes of this presentation.

Case 1

"So, we had a 45-year old female patient, who had a very high refractive error of 9 D sphere and 6 D cylinder in the spectacle plane before surgery," said Dr Alpíns. "Keratometry was a little over 4 D, obviously reflecting high astigmatism but not equivalent to the refractive cylinder."

He explained that the patient was implanted with a toric IOL with a 10.5 D sphere and 5.25 D cylinder (SN60T8, Alcon Laboratories, Fort Worth, Texas, USA). All the relevant data was plugged into the ASSORT* web toric calculator (www.assort.com, see Figure 1), which then calculates the power of the implant at the corneal plane and what refraction should be expected in spherocylindrical terms.

"However, we were surprised as we didn't get the result we expected, which is a disappointment to the patient and to us," Dr Alpíns continued. So, using the online calculator again as a problem solver, he noted that by inputting the postoperative spherocylindrical refraction it is possible to determine the position of the implant and thus if rotation can minimize the remaining refractive cylinder.

"When we did that calculation we found that if we rotated the implant 23° clockwise we would have only 0.32 D of refractive cylinder leftover rather than 2.5 D, which is a significant reduction," he said (see Figure 2). "So, in this patient we can

actually just do a rotation, which is a relatively simple procedure within the first month after surgery. Her refraction and her unaided visual acuity actually went from 6/24 to 6/5, which was excellent."

Case 2

In the second case a male patient was implanted with a lens of 24 D sphere and 4 D cylinder (ZCT400, AMO, Santa Ana, California, USA), and his remaining astigmatism was also around 2.5 D. However, in this case, when looking at the position of the lens, the remaining refractive cylinder by rotation would only go down to about 1.75 or 2 D, which was not considered satisfactory.

"Therefore, rotation was not going to work for this patient," confirmed Dr Alpíns. "So, what is the next option for him? Well, you think perhaps we should change the implant. So, we looked at the astigmatic vector analysis and found that his magnitude of error was very low indicating that the correct toricity of the IOL was selected, and so this wouldn't help either. Hence, LASIK was the best option for him to correct his unaided vision."

Conclusions

In cases of refractive surprises there are several possibilities to consider. Perhaps the lens was not aligned quite where planned, or perhaps the lens rotated after surgery. However, there are some instances where everything was perfect surgically speaking regarding the alignment of the implant, but the patient had a high amount of ocular residual astigmatism (ORA) years before cataract surgery.

In short...

In this article, Dr Alpíns describes two cases where toric IOL surgery outcomes were not as expected and explains how calculation of refractive surprises can help surgeons decide on what option to take to reduce or eliminate the remaining refractive cylinder.

Figure 1: The ASSORT toric IOL calculator allows selection of any IOL available and displays the expected spherocylindrical refraction.

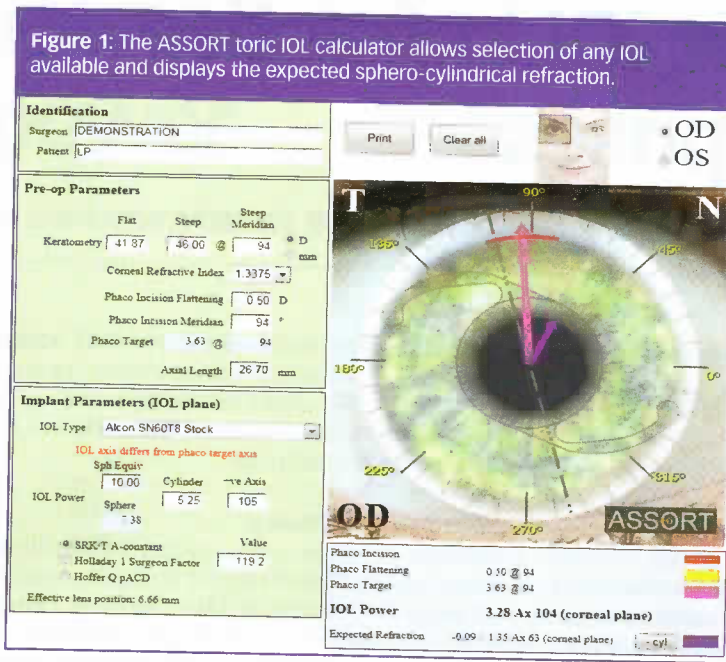
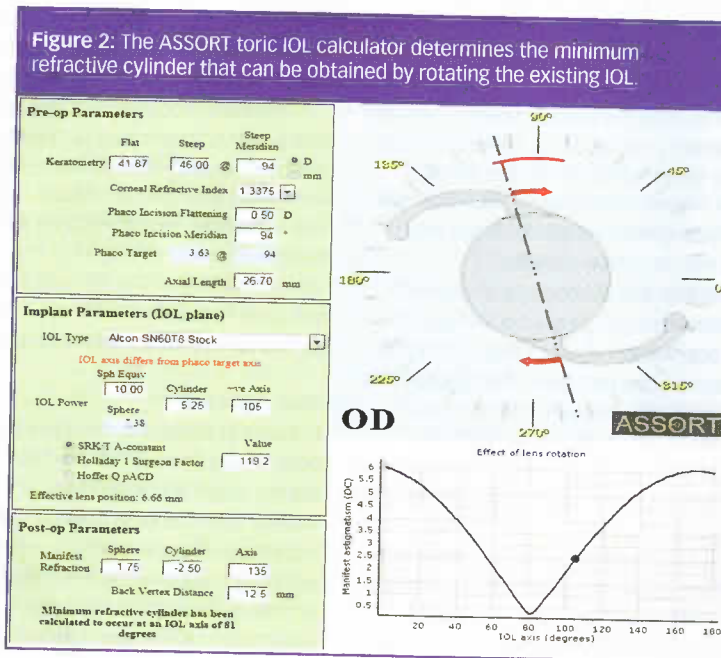


Figure 2: The ASSORT toric IOL calculator determines the minimum refractive cylinder that can be obtained by rotating the existing IOL.



"In summary, the treatment modes you have to correct for a refractive surprise are that you can rotate the lens, where you can significantly reduce refractive cylinder, or you can exchange the implant if you are unhappy with the power of the lens, if you prefer to do a surgical procedure of implant exchange rather than

LASIK, or if you have a magnitude and an axis problem then LASIK is the answer," concluded Dr Alpins. "You have to look through it all to determine what the best treatment is for your patient when they give you refractive surprises, which are going to be prevalent no matter how you do the surgery."

References

1. N. Alpins, 'Understanding and correcting for toric IOL refractive surprises', Free Paper Presentation, ESCRS 2013, The Netherlands.
2. N. Alpins, J.K.Y. Ong and G. Stamatelatos, *J. Cataract Refract. Surg.*, 2014;40:283-294.

Further reading

In a recently published paper,² Dr Alpins et al. described how to calculate the angle of rotation to minimize the amount of manifest refractive cylinder irrespective of the toric power at the corneal plane specified by the lens manufacturer, by using optimized lens constants that account for eye-specific and surgeon-specific factors.

Through these calculations it is possible to discern whether the refractive surprises are surgeon dependent (which can be improved upon) or as a result of differences within the patient's eye and as such will enable effective management of a patient's expectations post-op and ultimately will enable the optimum visual outcome to be achieved.

(Study details: N. Alpins et al., 'Refractive surprise after toric intraocular lens implantation: Graph analysis', *Journal of Cataract & Refractive Surgery*, 2014, vol. 40, pp 283-294.)

*ASSORT is a registered trademark.

How do you deal with refractive surprises?

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Special contributor

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Dr Alpins has a financial interest in the Assort software program used to support the planning and analysis of astigmatic correction.