EDITORIAL

Advances in Astigmatism Management

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A stigmatism correction, the next-to-final frontier! While presbyopia correction remains the Holy Grail of refractive surgery, astigmatism correction is a close second in importance. Astigmatism is the single most pervasive barrier to high-quality visual acuity, and its correction has lagged behind myopia and hyperopia, especially for lenticular surgical techniques. Treatment alignment issues, the absolute amount to be treated, and imprecise effects from various treatments, such as limbal relaxing incisions (LRIs), have contributed to this variability in outcomes.

Perhaps nowhere else is the convergence of corneal and lenticular surgery more obvious and synergistic than in astigmatism management. We have a growing number of options for treating astigmatism at the corneal and intraocular level, for treating astigmatism only or in combination with presbyopia, and potentially options suitable for treating astigmatism in irregular corneas. This month’s issue of the Journal of Refractive Surgery reports outcomes from many exciting techniques for treating astigmatism through lenticular surgery.

Among the most novel approaches to come along in years, the Light Adjustable Lens from Calhoun Vision (Pasadena, California), shows promise in treating low and moderate amounts of astigmatism, in addition to spherical error, without requiring specific intraocular alignment. Lichtinger and colleagues report good success in treating up to 2.00 diopters of astigmatism, using a digital light delivery device with treatments between 10 days and 3 weeks after Light Adjustable Lens implantation to reduce astigmatism and then “lock in” treatment effect. The upper level of astigmatism treatable by this technique is currently unknown. For larger amounts of astigmatism, Ouchi and Kinoshita report success utilizing a combination of the AcrySof toric intraocular lense (IOL) (Alcon Laboratories Inc, Ft Worth, Texas) with traditional LRIs. Higher power toric IOLs than those used in this study are now approved in the United States, so even greater treatments may be amenable to this technique. Future comparisons of efficacy between toric IOLs combined with traditional versus femtosecond laser LRI may determine the real benefits in accuracy and reproducibility obtainable with femtosecond laser–created LRIs.

To address both astigmatism and presbyopia, Mojzis and colleagues evaluated the efficacy of a toric multifocal IOL (AT LISA 909M; Carl Zeiss Meditec, Jena, Germany) implantable through sub-2.2-mm incisions and found good efficacy and accuracy for correction of astigmatism and presbyopia. Other toric multifocal IOLs are currently available, with more likely to become available in the near future. Time will tell if this combined option is favored by patients when compared with lenticular presbyopia correction and corneal astigmatism correction.

Precise alignment is critical for all astigmatism correction options, as even relatively small errors diminish treatment effect. Cha and colleagues report a new axis marking method to improve the accuracy of IOL placement using anterior segment photography, calipers, prominent vessels as landmarks, and analysis using Photoshop (Adobe Systems Inc, San Jose, California) to facilitate translating the data analysis into actual intraoperative marking. Other intraoperative evaluation techniques, including the ORange intraoperative wavefront aberrometer (WaveTec Vision Systems Inc, Aliso Viejo, California), may prove even more accurate and further improve efficacy. Appropriate IOL alignment is especially critical in patients with previous keratorefractive surgery, as the functional axis of astigmatism may be different than that detected by standard evaluation techniques, resulting in significant error demonstrated in a case reported by Forseto and colleagues.

Finally, what about options for treating irregular astigmatism? I recently discussed the direct corneal management options available to date; however, Jaimes and colleagues report a controversial treatment ap-

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doi:10.3928/1081597X-20110823-01
approach for toric IOL implantation in patients with “stable” keratoconus. Although their results look promising in the short-term, many questions remain as to the rationale for using an intraocular approach to correct irregular corneal astigmatism and what may or may not happen over time given the potentially progressive nature of ectatic corneal disease. If shown to be stable in the long-term for select patients, this technique will provide yet another option for reducing refractive error for our patients with keratoconus.

Many exciting astigmatism treatment options are available today that were not a few years ago, and more and more combination treatments will surely emerge soon to better refine our treatment protocols and improve outcomes for our patients.

REFERENCES


