Respect for Corneal Astigmatis

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Respect for Corneal Astigmatism

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Opinion

A high degree of attention is commonly paid to the accuracy in determining the amount of corneal astigmatism for toric IOL implants, however when it comes to refractive laser surgery corneal astigmatism does not receive such a high consideration in either the treatment or the postoperative result. Most refractive laser treatments are based on the refraction exclusively – manifest or wavefront, regardless of pre-existing corneal astigmatism. Consideration of the magnitude and the orientation of the astigmatism on the cornea preoperatively should be done routinely so that the patient can be advised if all the astigmatism can be corrected and the likely astigmatic target outcome.

The difference between the refractive cylinder at the corneal plane and the corneal astigmatism is termed the Ocular Residual Astigmatism (ORA) [1,2] and is expressed in diopters together with an axis. An ORA greater than 0.75D is considered significant [1,2]. If the refractive laser treatment is based on refractive parameters alone then all the ORA will be left on the cornea postoperatively to neutralise this internal aberration. The effect of leaving excess astigmatism on the cornea, and in 7% of cases this can be greater than the corneal astigmatism measured preoperatively [1], is that the quality of vision can be impaired due to glare, ghosting, starbursts and halos (known as GASH). So, the patient may end up having 20/20 unaided vision in daylight, however, is unhappy as a result of the quality of vision, particularly under low light where these symptoms become more problematic with a dilated pupil. The method of Vector Planning systematically combines the corneal astigmatism and the refractive cylinder in the treatment plan by first calculating the ORA and then apportioning this to the cornea and the refraction to minimize the amount of corneal astigmatism postoperatively without compromising the refractive cylinder [3,4].

The combination of a high ORA preoperatively (>1.00D), high corneal astigmatism (>1.00D) postoperatively and any one or more of these symptoms of GASH comes under the condition known as PALS: Predictable - astigmatic outcomes if the ORA is calculated preoperatively, Avoidable – as incorporating corneal astigmatism into the refractive treatment, such as in Vector Planning, which will reduce the corneal astigmatism remaining, LASIK - can apply to PRK and SMILE procedures as well as LASIK, Surprise - unexpected GASH symptoms. There have been a significant number of unhappy patients with symptom(s) of GASH writing to the FDA and the New York Times expressing their dissatisfaction after LASIK [5].

Dr Alpins presented a case study at the recent AECOS meeting in Aspen to demonstrate this condition. A 34-year-old male attended complaining of symptoms of glare, ghosting, starbursts and halos as well as a reduction in contrast sensitivity after bilateral LASIK. To reduce his symptoms, he shone his cell phone torch light directly at his eyes to constrict his pupils and be able to drive at night. His unaided vision was 20/20 in each eye however the amount of corneal astigmatism postoperatively was >1.00D in each eye (Figure 1).

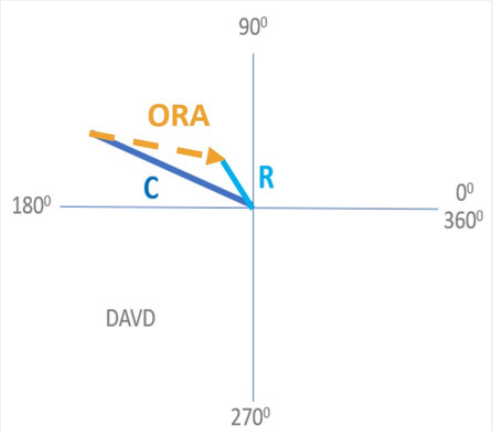

Figure 1: The ocular residual astigmatism (ORA) quantifies the vectorial difference between corneal astigmatism and refractive cylinder at the corneal plane. R= refractive, C=corneal.

To reduce the incidence of PALS post excimer laser surgery it is imperative that the ORA is calculated routinely preoperatively and addressed using Vector Planning. Currently none of the excimer laser systems consider how much astigmatism will remain on the cornea after LASIK and don't place any limit on corneal astigmatism post LASIK. This can be achieved by employing Vector Planning. The laser manufacturers need to make this paradigm available to the surgeon so that the maximum amount of astigmatism can be treated, reducing the amount of corneal astigmatism remaining postoperatively. Only then will the satisfaction rate of laser surgery consistently improve closer to 100%. Until this facility is provided by lasers currently in use, refractive surgeons can use a free application at www.assort.com to calculate the ORA and the appropriate Vector Planning treatment.

Prof. Noel Alpins and Mr George Stamatelatos report a financial interest in ASSORT Surgical Management Systems which holds trademarks in Vector Planning™.

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