

### **Refractive keratectomy with vector planning for keratoconus maintains outcomes at 10 years**

Photoastigmatic refractive keratectomy with vector planning is safe and effective for reducing myopia and astigmatism in eyes with forme fruste and mild keratoconus, according to **Noel A. Alpins, FRANZCO, FRCOphth, FACS**, who presented the 10-year results of the procedure.

Whereas most laser eye surgery is guided by refractive astigmatism, Dr. Alpins explained, vector planning uses ocular residual astigmatism – the vectorial difference between refractive and corneal astigmatism – to calculate ablation parameters.

Treatment by refraction or wavefront alone leaves all of the ocular residual astigmatism on the cornea, Dr. Alpins said. Vector planning, however, aims to correct astigmatism equally, with 50% emphasis on reducing both topographic and manifest refractive astigmatism, instead of 100% on refractive astigmatism, he wrote in his study. The resultant treatment is more closely aligned to the principal corneal meridia, he said.

“So we’re actually halving the amount of astigmatism left on the cornea, and the nice surprise is that we did better in the refractive element as well,” Dr. Alpins said. The reduction of excess astigmatism is key for keratoconic patients, he said, as it has an irregular component and may be the cause of negative outcomes common in these patients.

In the study, Dr. Alpins and George Stamatelatos, BScOptom, retrospectively tracked 45 patients with mild or forme fruste keratoconus who underwent the procedure. At baseline, all patients had a best corrected visual acuity of 20/40 or better, no signs of keratoconus at slit lamp, mean keratometry less than 50 D and corneal and refractive stability for at least 2 years.

Preop mean refractive astigmatism was  $-1.39$  D, and corneal astigmatism was  $1.7$  D. Mean ocular residual astigmatism was  $1.34$  D. Treatments were targeted to correct about 36% of corneal astigmatism and 64% of manifest cylinder. Surgeons used the Star S1 or S2 excimer laser (Advanced Medical Optics) on all patients.

At 12 months postop, refractive and corneal astigmatism had improved to  $-0.43$  D and  $1.02$  D, respectively. UCVA was 20/20 or better in 56% of eyes and 20/40 or better in all eyes. BCVA was 20/20 or better in 89% of eyes and 20/30 or better in all eyes. Overall, 16 eyes gained BCVA and seven eyes lost BCVA, Dr. Alpins said.

A total of 32 eyes had 5 years of follow-up and nine eyes had 10 years of follow-up. At last follow-up, the group’s spherical and refractive outcomes were stable and there were no cases of keratoconus progression or ectasia, Dr. Alpins said. This may be the result of careful patient selection, he said.