Intracorneal Ring Segments and Phakic Intraocular Lens

To the Editor:

We read with interest the article by Cakir and Utine regarding the results of combined intracorneal ring (KeraRing; Mediphacos Ltd, Belo Horizonte, Brazil) and anterior chamber, iris-fixated, phakic intraocular lens (IOL) (Artisan/Artiflex; Ophtec BV, Groningen, The Netherlands) implantation in patients with keratoclastic, which appeared in the February 2011 issue of the Journal of Refractive Surgery, and would like to comment that the results and the conclusions coincide with those presented by Navas. In their work, Navas et al conducted a similar evaluation on seven eyes of six patients with keratoconus who underwent sequential intracorneal ring: six eyes received Intacs (Addition Technology Inc, Des Plaines, Illinois) and one eye corneal rings (Visiontech Medical Optics Ltd, Belo Horizonte, Brazil), and posterior chamber Implantable Collamer Lens (Visian ICL; STAAR Surgical, Monrovia, California). Four eyes were implanted with the toric ICL and three eyes with the spherical ICL (Fig).

In our study, mean uncorrected distance visual acuity (UDVA) improved from 0.05±0.03 preoperatively to 0.57±0.13 after both procedures (P=.0001 for all).

Mean manifest refraction spherical equivalent (MRSE) decreased from −11.03±4.80 diopters (D) preoperatively to −0.46±0.52 D after both procedures (P=.0003).

All patients had a noticeable subjective improvement. Similar results were reported by Cakir and Utine, who found visual and refractive improvements after both procedures. We noticed a slightly better postoperative mean UDVA. However, Cakir and Utine reported a better postoperative MRSE with a high standard deviation.

We used 6.0-mm optic diameter intrastromal rings in six cases and 5.0-mm in one case, without any difference in the final outcome. Other authors have reported good results with combined intracorneal ring segments...
and anterior chamber, iris-fixated, phakic IOLs in keratoconus eyes, with good results; however, this may be technically challenging and the non-flexible version requires implantation through a scleral tunnel.³

We prefer posterior chamber phakic IOLs due to the quality of the optics and the stability that the toric version offers for the treatment of high astigmatism, as optical correction of stable keratoconus with phakic toric IOLs has been reported previously.⁴

Overall, we agree with Cakir and Utine that the combined implantation of intracorneal ring segments and phakic IOL for the treatment of keratoconus is a safe and effective bioptic procedure, which has proven to be both predictable and accurate.

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The authors have no financial interest in the materials presented herein.

REFERENCES

Reply:
We appreciate the comments of Navas et al regarding our article.¹ They present similar results in patients with keratoconus, where sequential intracorneal ring and posterior chamber phakic intraocular lens (IOL) implantation led to improvement in visual acuity and reduction in refraction. Although the rationale of their treatment is similar to ours, there are differences in the tools used.

It has been demonstrated that the closer the implanted intracorneal ring is to the visual axis, the greater the corneal flattening and refractive correction effect.² Furthermore, in case of an unsatisfactory result, penetrating keratoplasty would be technically easier when the diameter of the implanted intracorneal ring segment is smaller compared to larger. We also believe that posterior chamber phakic IOLs should be used with caution due to the possibility of lenticular complications and the impact of rotation on refractive result; whereas the “one-size-fits-all” characteristics of iris-fixated, anterior chamber IOLs create an advantage in keratectatic eyes with deep anterior chambers.

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The authors have no financial interest in the materials presented herein.

Subjective Refraction Before LASIK Enhancement in Bioptics Procedures With Refractive Multifocal Intraocular Lenses

To the Editor:
In the so-called bioptics approach, a secondary excimer laser procedure is performed for residual ametropia after primary intraocular lens (IOL) implantation.¹ Recently, three patients presented who developed a hyperopic defect following LASIK for residual ametropia after cataract surgery with a refractive multifocal IOL. Subjective refraction before LASIK ranged between −1.00 and −1.50 diopters (D), with corrected distance visual acuity (CDVA) ranging between 20/32 and 20/25. After uneventful myopic LASIK in one eye of each patient, all three eyes presented a hyperopic outcome of +2.50 D with CDVA of 20/20 in every case. Retrospective examinations of ablation reports in all three eyes excluded any possible source of error.

A likely explanation for the hyperopic surprise found in these patients is presented herein: subjective refraction for CDVA was obtained using the near focus of the multifocal IOL, therefore, the eyes were not myopic of −1.00 to −1.50 D, but hyperopic of +1.00 to +1.50 D. Hence, the myopic ablation resulted in a more hyperopic residual defect.

Distance vision in an eye implanted with a multifocal IOL can be corrected by using either of the two principal foci of the IOL, but only if the far focus is in-focus for far vision, will the near focus be useful for near vision. The Figure shows the typical defocus curve of a

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refractive multifocal IOL. Given an eye with an actual residual hyperopia of +1.00 D after refractive multifocal IOL implantation, CDVA can be obtained using the real ametropia of +1.00 D (point A in the Figure: far focus in-focus for far and near focus in-focus for near) or −1.25 D (point B in the Figure: far focus out-of-focus for far and near focus in-focus for far and out-of-focus for near). Before any secondary intervention, it is necessary to confirm that the far focus of the multifocal IOL is being used for distance subjective refraction. This can be done by any of the following tests:

- Once CDVA has been determined, distance-corrected near visual acuity should be measured and it should be similar or slightly inferior to CDVA, depending on the multifocal IOL model.
- A +2.25- or +2.50-D lens should be placed on top of the refraction for CDVA, and far vision should be measured again to show a slight decrease, because the near focus of the IOL is being used for distance vision.
- Unexpected outcomes in any of the three tests indicate the possibility of having used the near focus of the refractive multifocal IOL for far vision, leading to a false diagnosis of myopia in an eye that actually presents with low hyperopia.

Pseudomyopia in eyes with multifocal refractive IOLs has been reported using automatic refraction, and therefore, autorefractometers are not helpful in this situation.2,3 Careful subjective refraction before LASIK enhancement in bioptics using refractive multifocal IOLs is mandatory.

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REFERENCES

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