Two target locations for corneal inlay implantation combined with laser in situ keratomileusis

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PURPOSE: To compare the visual acuity outcomes between 2 target locations for corneal inlay implantation with concurrent laser in situ keratomileusis (LASIK) to compensate for presbyopia.

SETTING: Shinagawa LASIK Center, Tokyo, Japan.

DESIGN: Retrospective cohort study.

METHODS: Bilateral LASIK was performed simultaneously with inlay implantation in the nondominant eye. The preoperative and 6-month postoperative uncorrected distance (UDVA) and uncorrected near (UNVA) visual acuities were evaluated. Patients were divided into the following 2 groups based on the pupil center to Purkinje reflex distance (Pp–Pk): small (≤300 μm) and large (>300 μm). Each group was divided into subgroups according to the distance of the inlay center to the Purkinje reflex (I–Pk) or to the midpoint between the pupil center and Purkinje reflex (I–M). The inlay position was classified as 0 to 100 μm, 101 to 200 μm, 201 to 300 μm, and 301 to 400 μm from the Purkinje reflex and from the midpoint.

RESULTS: Of 1008 patients, 992 were available for postoperative follow-up. The UDVA and UNVA improved in both subgroups with all inlay positions (P < .0001). There were no statistically significant differences in UDVA or UNVA within or between the small Pp–Pk group and the large Pp–Pk group (P > .05). The Spearman rank-order correlation showed weak associations between the inlay distance and visual acuity.

CONCLUSION: The amount of inlay decentration had no influence on postoperative visual acuity.

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Barraquer first described corneal inlay implantation in 1949. Since then, there has been an evolution in inlay design, composition, and surgical technique. At present, 3 types of corneal inlays for refractive surgery are commercially available; that is, those that alter the refractive index of the cornea with a bifocal optic, those that change the curvature of the cornea, and those that increase the depth of focus using small-aperture optics.

The Kamra corneal inlay (Acufocus, Inc.) was introduced in a prospective U.S. Food and Drug Administration trial in February 2006. The earlier generation of this inlay had a 10 μm thickness; was polyvinylidene fluoride, the same material used for the haptics of some intraocular lenses; and had a total diameter of 3.8 mm and a central aperture of 1.6 mm. The inlay has a pseudorandom microperforation pattern that initially consisted of 1600 holes approximately 25 μm in diameter to allow water and nutrition flow. The nanoparticles consist of carbon that, with the earlier inlay, allowed light transmission at a rate of approximately 7.5%. The current-generation inlay is 5 μm thick and has 8400 holes ranging in size from 5 to 11 μm in diameter, allowing light transmission at a rate of 5%. More than 12,000 inlays have been implanted at our center since 2009. The visual acuity