Corneal inlay implantation to treat extensive glare and photophobia in a young patient with traumatic mydriasis

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We present a case of intracorneal inlay implantation (Kamra) to treat severe disabling glare secondary to traumatic mydriasis in a 33-year-old patient. During the 3-month follow-up, the patient showed significant improvement of symptoms with complete resolution of glare. This conforms to the objective assessment through amelioration of the point-spread function evaluation. Uncorrected visual acuity for distance and for near was 20/20 at 2.5 months. To our knowledge, this is the first report of intracorneal inlay implantation to treat extensive glare and photophobia secondary to traumatic mydriasis.

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CASE REPORT

A 33-year-old healthy man presented at our clinic for severe glare that started 12 years earlier after a nonpenetrating injury to his right eye that resulted in a mid-dilated pupil.

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On presentation, the uncorrected distance visual acuity (UDVA) was 20/40 in the right eye and 20/20 in the left eye. The corrected distance visual acuity in the right eye was 20/20 with a manifest refraction of −0.25 +1.00 × 100. The uncorrected near visual acuity (UNVA) was 20/25 in the right eye and 20/20 in the left eye. The near visual acuity improved to 20/20 in the right eye with a +0.50 sphere addition to the manifest refraction.

Slitlamp biomicroscopy revealed a fixed, completely nonreactive dilated pupil in the right eye with a diameter of 6.0 mm measured using the slit-size control at different lighting intensities. The anterior segment examination and fundoscopy were otherwise normal. Intraocular pressure at presentation was 12 mm Hg in the right eye and 13 mm Hg in the left eye.

Therapeutic options for glare were explained to the patient; they included artificial iris implantation, iris suturing, special contact lenses, and topical thymoxamine. Intracorneal inlay implantation was also suggested as a novel technique for reducing glare. The patient selected the intracorneal implant approach, and a detailed consent form was obtained after the experimental nature of this procedure to treat the condition had been explained. Corneal topography (Sirius, Schwind eye-tech-solutions), imaging (Acutarget, Acufocus, Inc.) (Figure 1), and aberrometry (Customvue Wavescan, Visx, Inc.) (Figure 2) were performed prior to the procedure. Corneal topography showed a regular cornea with a central corneal thickness of 573 μm (thinnest area 569 μm).

The procedure was performed on February 5, 2014, under topical anesthetic drops (oxybuprocaine 0.4% [Cebesine]). The femtosecond laser (Ziemer Femto LDV) was used to create a stromal flap (200 μm thick). After flap elevation, wavefront-customized excimer laser ablation (Wavelight Allegretto Wave Eye-Q Laser) was performed with a targeted refraction of −0.25 +1.00 × 100. Special instruments were used to handle the intracorneal inlay, which was placed under the stromal flap. Centration was based on the Acutarget image with...
alignment at midline between the center of the pupil and the coaxially sighted corneal reflex (Purkinje I) intraoperatively. The procedure lasted approximately 15 minutes.

Postoperatively, the patient was started on our standard topical treatment protocol after inlay implantation, which included ofloxacin (Oflox) and prednisolone acetate (Pred Forte) 5 times daily and artificial tears every hour for the first postoperative week and then prednisolone acetate 3 times daily and artificial tears every 2 hours for the next 2 weeks. Topical treatment then included loteprednol (Lotemax) 3 drops per day tapered every 2 weeks in addition to artificial tears as needed.

One day postoperatively, the patient reported significant improvement in glare. In the right eye, the UDVA was 20/80 and the UNVA, 20/80. Anterior segment examination revealed a clear cornea and a well-centered intracorneal inlay. At 1 week, the UDVA in the right eye was 20/40 and the UNVA was 20/30 and the slitlamp examination was unremarkable. The patient confirmed that he had no residual glare by that time. At 1 month, the UDVA in the right eye was 20/25 and the UNVA was 20/20; the slitlamp examination was unremarkable. At 2.5 months, the UDVA in the right eye was 20/20 and the UNVA was 20/20. Wave-scan aberrometry was repeated and showed significant improvement in the point-spread function (PSF) and higher-order aberrations (HOAs) (Figure 3).

**DISCUSSION**

Intraocular procedures (prosthetic iris implantation and iris cerclage suture) for correction of traumatic mydriasis have proven to be effective.1–4 However, these procedures carry the risk for serious intraoperative and postoperative complications such as anterior capsule tear, postoperative anterior uveitis, secondary glaucoma, and implant migration.7 Topical thymoxamine has been found to be beneficial in treating the traumatic dilated pupil but was ineffective in some cases, with side effects including ocular irritation and hyperemia.5

In our patient, intracorneal inlay implantation was the safest and least invasive option to reduce glare without the need for long-term topical treatment. Although the only indication for the inlay is presbyopic correction in elderly patients,6 its successful use in a young pseudophakic patient has been described.8 Moreover, examination and imaging of ocular structures are not affected by the inlay, and visual field testing shows no change from the preoperative values.9 Confocal microscopy imaging shows good corneal tolerance to the intracorneal inlay.9 Furthermore, the inlay can be safely removed in case of patient dissatisfaction, with good recovery of visual acuity, corneal topography, and corneal aberrometry.10

Our patient noted dramatic reduction in glare immediately following the procedure. The UDVA and UNVA improved progressively, reaching 20/20 at 2.5 months. Comparison of the aberrometry imaging before and after implantation of the inlay showed...
significant improvement in PSF and HOAs (Figure 3) with a decrease in the root-mean-square error from 0.24 μm preoperatively to 0.04 μm postoperatively. This effect is anticipated as HOAs increase with increasing pupil size. Therefore, the improvement in glare is attributed mainly to the pinhole effect of the inlay, which covers a 3.8 mm diameter of the 6.0 mm mydriatic pupil when seen along the optical axis (Figure 4). Although in this case the intracorneal inlay covers approximately 40% of the pupil, it seems to be enough for sufficient improvement in glare.

To our knowledge, this is the first report of the use of the Kamra inlay for treatment of glare secondary to traumatic mydriasis. Further studies with long follow-up periods are needed to determine the long-term effects and stability of symptomatic improvement after implantation of the inlay.

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