

was 1.6 lines; however, a significant number of eyes had no uncorrected vision data at 1-year follow-up. Of 26 eyes, 14 (53.8%) gained lines of UCVA at day 1, and 3 (11.5%) at 1 year.

DISCUSSION

Residual refractive error is the most frequent reason for dissatisfaction after LASIK. Retreatments for residual refractive error can have complications, which may potentially be avoided if epithelial retreatments can provide satisfactory results for some of these patients. Specifically, epithelial ingrowth, flap wrinkling, and diffuse lamellar keratitis theoretically should not occur as a consequence of an epithelial retreatment. In our small study, no eyes had a loss of BSCVA secondary to the retreatment surgery.

One limitation of this study was the low follow-up at 1 year postoperatively. This may be because patients were pleased with their vision and believed follow-up was unnecessary or were frustrated with a lack of improvement in their vision, and consequently did not follow-up.

Guell et al⁶ reported that 52% of eyes treated with a similar technique were within 0.50 D of emmetropia, which is similar to our results of 57% at 1 year. We chose the main endpoint in the current study as progression to flap-lift retreatment as a failure of the treatment due to the lack of a defined data endpoint. A relatively high number of eyes (8 eyes, 29.6%) went on to have another retreatment before 1-year postoperative follow-up. The change in spherical equivalent refraction pre- to postoperatively was not clinically significant, mainly because of the small degree of correction attempted and achieved, with the fluctuation in refractive errors from visit to visit falling in a similar range to the treatment amounts, and thus the number of eyes requesting further retreatment is likely to be a better indicator of success of treatment.

Epithelial retreatment may be a useful consideration for some patients with symptomatic low degrees of refractive error. Because of the low rate of visual improvement and poor predictability at 1 year, its use will likely be limited. Despite the high rate of subsequent retreatment, and the lack of statistically significant change in refractive error, the low rate of complications suggests that it may be useful for some eyes. In addition, if the patient perceives a good response on day 1 that regresses over time, it may suggest that improvement in symptoms can be achieved with either a flap-lift retreatment or surface ablation retreatment with a similar ablation profile.⁷⁻¹⁰

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Hyperopic Keratoconus

Juan Carlos Abad, MD; Abraham Awad, MD;
Joseph M. Kurstin, MD

ABSTRACT

PURPOSE: To report three patients (four eyes) with hyperopic keratoconus.

METHODS: Patients were evaluated with corneal curvature topography, ultrasonic pachymetry, and rotating Scheimpflug camera.

RESULTS: One patient, without other risk factors, developed unilateral ectasia after LASIK following primary hyperopic ablation in an eye suspicious for keratoconus. Two additional hyperopic patients (three eyes) had curvature and elevation findings compatible with keratoconus.

CONCLUSIONS: Although rare, keratoconus could present in hyperopia. If keratoconus is suspected, we suggest avoidance of LASIK and its potential for development of corneal ectasia. [*J Refract Surg.* 2007;23:520-523.]

Most cases of ectasia after LASIK have occurred in patients with myopic refractive errors.¹⁻⁴ We report ectasia after primary hyperopic LASIK in a patient with subclinical keratoconus, and two hyperopic patients with preoperative findings compatible with keratoconus.

CASE REPORTS

CASE 1

A 48-year-old woman presented for refractive surgery in June 2001 with uncorrected visual acuity (UCVA) of 20/60 and best spectacle-corrected visual acuity (BSCVA) of 20/20 in both eyes, and refraction of +1.00 diopters (D) sphere. The patient did not use optical correction for distance, and used over-the-counter +2.25 sphere reading glasses. Keratometry was 44.25/44.00 D @ 46 in the right eye, and 44.50/43.75 D @ 176 in the left eye. Corneal topography with a Humphrey Atlas, Version A11.2 (Carl Zeiss Meditec Inc, Jena, Germany) topographer showed a normal pattern in both eyes (Fig 1). Ultrasonic central corneal thickness with the Pachette 2 (DGH Technology Inc, Exton, Pa) pachymeter was 530 and 535 μm in the right and left eyes, respectively, and four additional mid-peripheral values were thicker than central values. After 1 week of contact lens monovision testing (+1.00 and +3.00 sphere in the right and left eyes, respectively), the patient opted to have the right eye corrected for distance and the left eye corrected for near vision.

Bilateral LASIK with a manual, 130-head Moria CB (Moria, Antony, France) microkeratome and a VISX Star2 (VISX, Santa Clara, Calif) excimer laser was performed in June 2001. During primary and further enhancement procedures, the active tracking was engaged after the pupil center was found while having the patient look at the coaxial fixation light. In the right eye, spherical laser correction of +1.12 D with an optical zone of 4.5 mm and ablation diameter of 8.5 mm was performed, for a maximum peripheral ablation depth of 8 μm . In the left eye, correction of +3.44 D with an optical zone of 4.5 mm and ablation diameter of 8.5 mm was performed, for a maximum peripheral ablation depth of 25 μm .

In March 2002, the patient complained of “fuzzy” distance visual acuity. Uncorrected visual acuity in the right eye was 20/30, refraction was +0.50 -1.25×56 (20/20), K reading was 45.25/44.50 D @ 39, and the topographic difference map showed a well-centered

ablation. Trial spectacles with correction in the right eye (leaving the left eye uncorrected) improved the patient’s visual complaints. She subsequently underwent enhancement in the right eye by lifting the flap. Ultrasonic central corneal thickness was 539 μm at retreatment, and the central bed prior to ablation was 331 μm . Laser ablation with a VISX mixed-cylinder card was +0.50 -1.25×56 , with 5.0-mm optical zone, 9.0-mm ablation diameter, and 4- μm depth of ablation for the hyperopic component, and 6.5-mm optical zone, 5.0-mm ablation diameter, and 7- μm depth of ablation for the myopic component.

In February 2004, UCVA was 20/30 in the right eye with a refraction of plano -0.75×87 (20/25), and K reading of 45.55/45.20 D @ 101. In May 2005, the patient was diagnosed with breast cancer and underwent chemotherapy. She presented again in January 2006 with UCVA of 20/80 in the right eye, refraction of plano -4.50×65 (20/50), K reading of 50.50/47.00 D @ 73, and steepening compatible with ectasia in the topographic difference map (see Fig 1). A rotating Scheimpflug (Pentacam; OCULUS Inc, Lynnwood, Wash) camera analysis of the right eye revealed an anterior localized inferior paracentral protrusion of 32 μm , with a corresponding posterior protrusion of 61 μm . While reprocessing the preoperative topographies using the Pathfinder Corneal Analysis of the Humphrey Atlas (Carl Zeiss Meditec Inc) topographer, the right eye was labeled as “Suspect Subclinical Keratoconus” based on increased prolateness and irregularity of the corneal surface. The left eye was labeled “Normal.”

The patient’s left eye remained stable for 55 months after LASIK, with UCVA of J1+, refraction of $-1.50 -0.50 \times 76$ (20/30), and K reading of 45.75/45.40 D @ 63. Several topographic difference maps throughout the postoperative period showed a well-centered ablation without further steepening. A Pentacam evaluation did not show abnormalities compatible with ectasia.

CASE 2

A 58-year-old man presented for refractive surgery in January 2006. Uncorrected visual acuity was 20/50 in both eyes, and BSCVA was 20/25 in both eyes with refraction of +1.25 -1.75×94 in the right eye and +1.75 -0.75×180 in the left eye. Keratometry was 45.65/44.90 D @ 53 in the right eye and 44.90/44.20 D @ 177 in the left eye. Corneal topography revealed non-orthogonal astigmatism (Fig 2). The Pathfinder Analysis system labeled both corneas as “Keratoconus Suspects” based on increased irregularity and prolateness of the corneas. Pentacam evaluation of the right eye revealed central corneal thickness of 454 μm and anterior paracentral inferior elevation of 13 μm over the best fit

From Laser Eye Center of Miami, Miami, Fla.

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Correspondence: Juan Carlos Abad, MD, Laser Eye Center of Miami, 1661 SW 37th Ave, Miami, FL 33145. Tel: 305.443.4733; E-mail: jcabad@gmail.com

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Reports

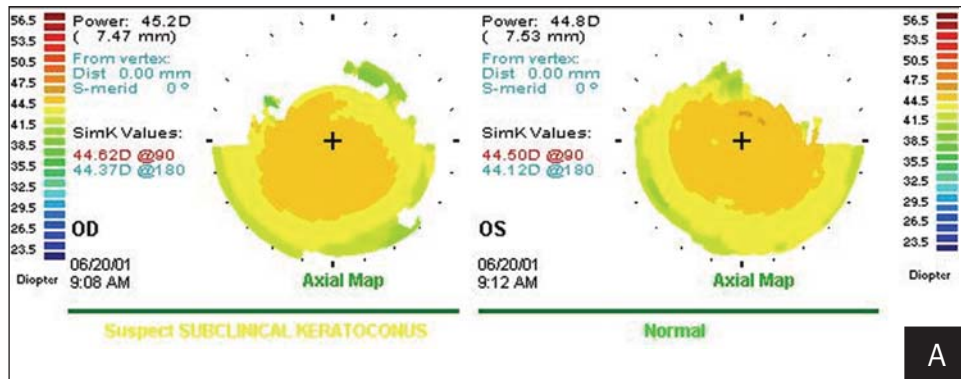
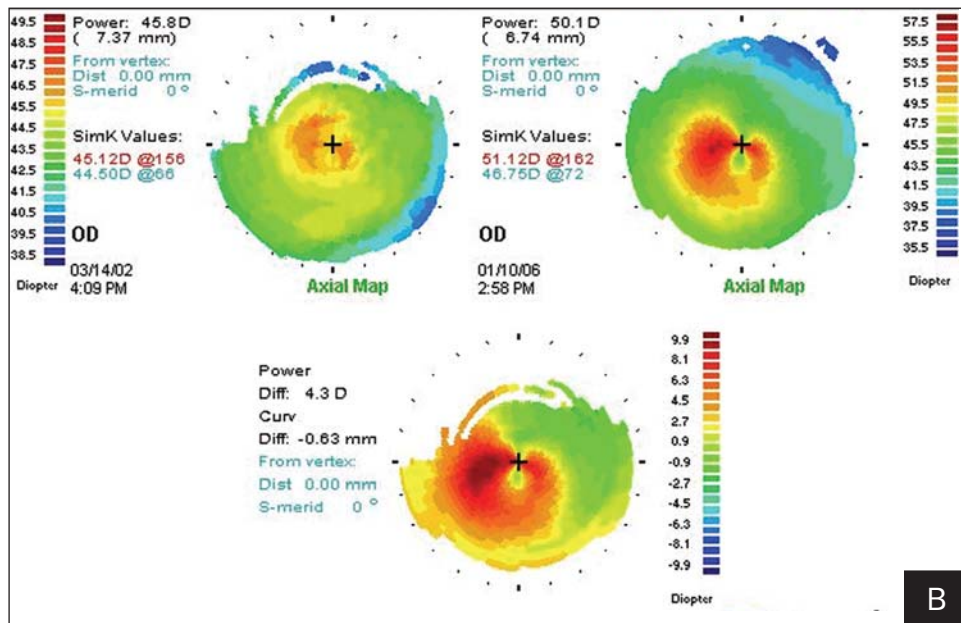


Figure 1. Case 1. **A)** Preoperative topography of right and left eyes shows a normal pattern. Note the Pathfinder Corneal Analysis labels the right eye as “Suspect Subclinical Keratoconus.” **B)** Difference map compares topography before enhancement (9 months after LASIK) and 55 months after LASIK.



A

B

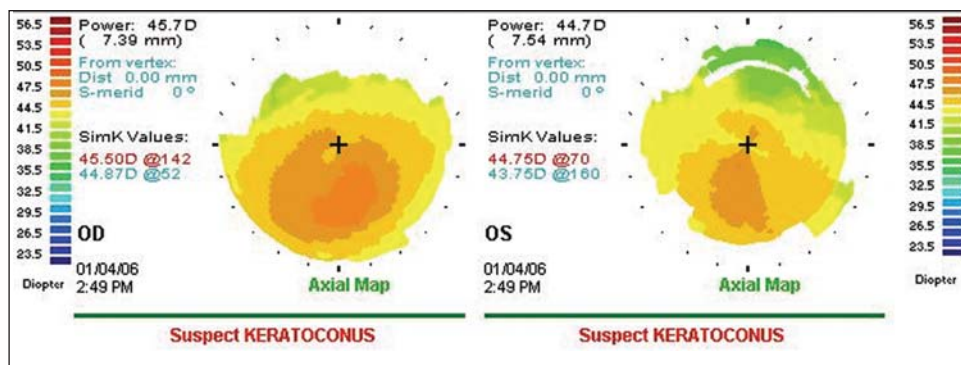


Figure 2. Case 2. Preoperative topography shows non-orthogonal astigmatism and inferior-superior asymmetry in both eyes. Note the Pathfinder Corneal Analysis labels both eyes as “Suspect Keratoconus.”

sphere, with a corresponding posterior protrusion of 32 μ m. Pentacam analysis of the left eye showed central corneal thickness of 451 μ m and anterior central elevation of 11 μ m over the best fit sphere, with corresponding posterior protrusion of 31 μ m. No corneal surgery was recommended.

CASE 3

A 65-year-old woman presented for refractive surgery in May 2005. Uncorrected visual acuity was

20/200 and 20/60 in the right and left eye, respectively, and BSCVA was 20/60 and 20/25 with +1.25 -1.00 \times 35 and +1.25 sphere in the right and left eye, respectively. Keratometry was 47.20/43.00 D @ 31 in the right eye and 43.00/42.92 D @ 15 in the left eye. Pentacam corneal evaluation of the right eye revealed central corneal thickness of 503 μ m, a non-orthogonal “snowman” pattern in the calculated curvature topography map, and an asymmetric peninsula in the anterior elevation map, with a corresponding protruding island of 52 μ m

in the posterior elevation map. The left eye had central corneal thickness of 498 μm and a borderline posterior protrusion of 18 μm , but no anterior (curvature or elevation) signs of keratoconus. After the findings were discussed, the patient elected to wear monovision contact lenses.

DISCUSSION

Postoperative ectasia is one of the most severe complications of LASIK. No cases of ectasia after LASIK for treatment of primary hyperopia have been reported. However, the literature does contain a theoretical reason why ectasia after hyperopic ablation does not occur.⁵ Lyle and Jin⁶ reported a patient with consecutive hyperopia after radial keratotomy who developed ectasia following LASIK. The development of ectasia after LASIK appears to be related to undetected keratoconus or to residual stromal beds that are left too thin.³ In the case reported by Lyle and Jin, underlying keratoconus can not be excluded.⁷ In our patients, case 1 had a normal topography pattern and no increased risk factors, but was labeled as "Suspect Subclinical Keratoconus" by the Pathfinder Corneal Analysis in the eye that developed ectasia after LASIK. Case 2 had definite bilateral keratoconus based on the corneal topography and Pentacam evaluations. Case 3 had findings compatible with keratoconus in the right eye based on Pentacam examination.

Although hyperopic keratoconus is rare, patients with Down syndrome have a higher incidence of hyperopia, and occasionally keratoconus.⁸ Each of our patients had an otherwise normal phenotype and mental status. The lower incidence of hyperopic keratoconus may be one reason why occurrence of ectasia after LASIK for primary hyperopia is less common. Other reasons may be biomechanical, as the peripheral cornea is thicker and able to withstand greater amounts of thinning, hyperopic corrections rarely exceed 6.00 D or approximately 90 μm , and the intraocular forces in hyperopic correction are diffused over a much broader area (transition zone)⁹ in contrast to myopic correction (center of ablation).

Because a hyperopic ablation steepens the central cornea, detection of progressive steepening in serial topographies may be needed to determine whether ectasia is present. If only one postoperative topography is available, a pre- to postoperative difference map showing steepening of the transition zone or central steepening greater than the planned ablation should raise suspicion of the possibility of ectasia.

We present ectasia after LASIK following primary hyperopic correction, most likely related to an underlying keratoconus. We also present two patients with

obvious hyperopic keratoconus. Although rare, the ophthalmic community should be aware that postoperative ectasia could occur in cases of LASIK for primary hyperopia in corneas with subtle signs of keratoconus.

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Corneal Suture for the Correction of Hyperopia Following Radial Keratotomy

Walton Nosé, MD; Daniela Endriss, MD;
Adriana S. Forseto, MD

ABSTRACT

PURPOSE: To report the visual and refractive changes observed after double concentric corneal suture to correct hyperopic shift after radial keratotomy (RK).

METHODS: This retrospective consecutive case series comprised 17 eyes (15 patients) that underwent two concentric corneal sutures (modified Grene Lasso suture) to correct hyperopic shift after RK. All surgeries were performed by the same surgeon between 2000 and 2003.

RESULTS: The mean time after RK was 11.6 ± 3.2 years. The mean follow-up was 20.3 ± 11.3 months. The spherical equivalent refraction was reduced from a preoperative mean of $+4.38 \pm 2.87$ diopters (D) to -0.54 ± 2.59 D at last postoperative follow-up ($P < .001$). No statistically significant difference was observed in mean refractive astigmatism before and after the corneal suture

($P=.15$). Before surgery, no eye presented with best spectacle-corrected visual acuity (BSCVA) $\geq 20/20$. At final follow-up, 3 (17.6%) eyes attained this level. Seven (41.2%) eyes improved their BSCVA by ≥ 2 Snellen lines. One (5.9%) eye lost 2 Snellen lines of BSCVA.

CONCLUSIONS: Corneal suture can be used to correct RK-induced hyperopia, improving the corneal asphericity in an attempt to stabilize these corneas. It appeared to be effective even for high degrees of hyperopia and in cases with associated irregular astigmatism or open incisions. [*J Refract Surg.* 2007;23:523-527.]

Radial keratotomy (RK) has been a commonly performed refractive technique around the world.¹ Although techniques have improved over the past 15 years, hyperopic shift remains a troublesome and undesired outcome of this surgery. It is one of the most significant disadvantages, with a frequency ranging from 17% to 43% and an additional incidence of 1% to 2% each year.^{1,2}

Overcorrection after RK has become of increasing concern, as a significant percentage of patients experience progressive hyperopia following RK.¹⁻⁶ Although spectacles and contact lenses can correct hyperopia, clear vision without these visual aids has long been a goal, and the frustrations experienced by surgeons and patients have led to a number of techniques to avoid this optical dependency.^{3,4,7}

Surgical intervention may be an alternative approach to treat overcorrection after RK and should be considered in cases in which the hyperopia is significant or symptomatic.^{3,4,7} Several methods have been used to correct hyperopia after RK: holmium laser thermokeratoplasty, corneal suture, photorefractive keratectomy, and LASIK represent some options.^{1,3,4,7,8} The surgeon's choice of treatment for hyperopic shift is mostly personal and experience-based as few studies are available. Sutures may be an alternative in the presence of excessive corneal flattening possibly associated with wound gape, epithelial plugs, or irregular astigmatism.⁴

Starling and Hofmann⁹ were the first to describe the technique of a continuous purse-string suture for the

correction of hyperopia after RK. They demonstrated that the placement of a continuous running purse-string suture into each newly opened radial wound and across the tissue bridge between each wound resulted in a circumferential suture that could be gradually tightened, steepening the central cornea.⁹ A modification of this approach was later developed, which involved a change in the suture path to compress gaped RK incisions and reverse RK knee (Greene Lasso technique).⁴

This study reports the visual and refractive changes observed in patients with symptomatic overcorrection following RK who were managed with double concentric corneal sutures.

PATIENTS AND METHODS

This retrospective study examined 17 corneal suture procedures performed on 15 patients (8 men and 7 women) suffering from symptomatic hyperopia ($n=17$) and astigmatism ($n=16$) after RK (6, 8, and 12 incisions, $n=17$) and arcuate keratotomy (2 incisions, $n=4$).

The preoperative database included age, sex, best spectacle-corrected visual acuity (BSCVA) using Snellen chart, cycloplegic refraction, computer-assisted photokeratoscope (EyeSys Corneal Analysis System; EyeSys Technologies, Houston, Tex), and ultrasonic pachymetry. Clinical evaluations were performed postoperatively at 1 day, 1 week, between 1 and 3 months, 6 months, and 1 year. No active ocular disease or any identified systemic disease likely to influence corneal wound healing was noted. Preoperatively, 2 (11.8%) eyes were associated with epithelial inclusion cysts and 5 (29.4%) with wound gape.

Cases were managed as outpatient day surgeries. All surgeries were performed by the same surgeon (W.N.) between April 2000 and May 2003 using topical anesthesia.

CORNEAL SUTURE TECHNIQUE

The central visual axis was marked with the aid of a Sinsky hook. The same hook was used to reopen the incisions and to remove epithelial plugs when necessary. Optical zone markers of 6.0- and 8.0-mm were centralized at the visual axis and impressed against the corneal epithelium. A gentle indentation was made at the limbus to help identify the location of the previously placed RK incisions.

A 9-0 nylon suture on a cutting needle was passed through the deep stroma (approximately 80% of the corneal thickness). The needle pathway was placed between the previous RK incisions, and the suture was passed over each radial incision, overlapping it. This was the only section of the suture that was exposed to

From Eye Clinic Day Hospital, São Paulo, Brazil.

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Correspondence: Walton Nosé, MD, Av República do Líbano, 1034, 04502-001, São Paulo, Brazil. E-mail: wnose@eyec clinic.com.br

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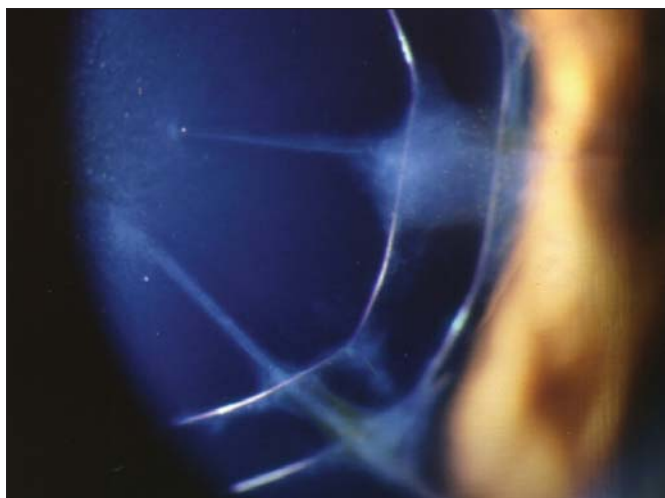


Figure 1. Photograph 1 year after double concentric corneal suture. Note the corneal scar around the suture.

the corneal surface. Two concentric sutures were performed to equalize corneal compression, one along the 7.0-mm optical zone and another along the 9.0-mm optical zone, starting at the 9 o'clock position. The 7.0-mm suture was tightened first, steepening the cornea, followed by tying the 9.0-mm suture somewhat more gently (Fig 1). A surgical keratoscope was used preoperatively and before completely tightening the suture. In two cases, single sutures of the arcuate incisions were performed in an attempt to reduce the astigmatism.

Postoperatively, topical corticosteroid/antibiotic, prostaglandin analog, and nonsteroidal anti-inflammatory drops were used and stopped by 2 to 4 weeks.

STATISTICAL ANALYSIS

In the following analyses, the changes that occurred between 1 and 3 months, 6 months, 1 year, and at last follow-up were examined for those patients with >1-year follow-up after corneal suture. For statistical analysis, *t* test for paired samples and analysis of variance with repeated measures were used; a *P* value <.05 was considered significant. Surgically induced astigmatism was calculated using Alpins' vectorial analysis method.¹⁰

RESULTS

Mean patient age at corneal suture was 40 ± 6.2 years (range: 31 to 52 years). Mean time between RK and corneal suture was 11.6 ± 3.2 years (range: 7 to 18 years). Mean follow-up was 20.3 ± 11.3 months (range: 12 to 50 months). Eleven (73.4%) patients were followed for >1 year and 4 (26.7%) for >2 years.

The spherical equivalent refraction was reduced from a preoperative mean of $+4.38 \pm 2.87$ diopters (D) (range: -1.00 to $+9.50$ D) to -0.54 ± 2.59 D (range: -5.50 to $+3.87$ D) at the last postoperative follow-up

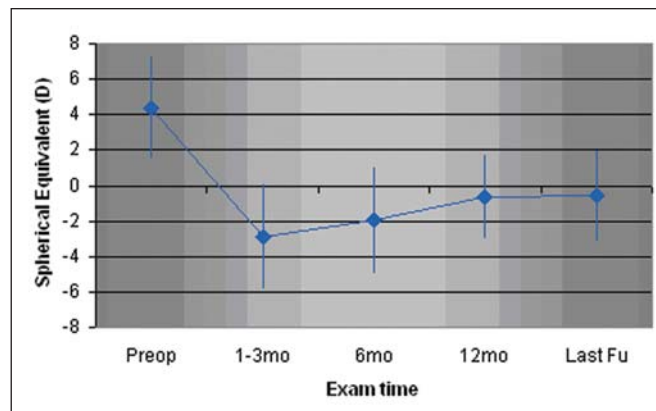


Figure 2. Graph of the mean cycloplegic spherical equivalent (in diopters) at baseline and subsequent follow-up after double concentric corneal suture (n=14).

(*P*<.001). A preplanned myopic shift was noted at the first postoperative examination with a tendency toward stabilization at the last postoperative examination (Fig 2). These postoperative differences in the spherical equivalent refraction were not statistically significant (*P*>.05). At last available follow-up, 7 (41.2%) eyes were within ± 1.00 D of emmetropia.

Mean refractive astigmatism changed from -2.82 ± 1.71 D preoperatively (range: 0.00 to -6.00 D) to -3.39 ± 2.05 D postoperatively (range: 0.00 to -8.00 D) (*P*=.147). At last postoperative follow-up, the vector calculated surgically induced astigmatism was 2.22 ± 1.79 (range: 0.0 to 6.56). The majority of cases presented no or small change in refractive astigmatism (Fig 3).

Average keratometry increased from 36.80 ± 3.50 D (range: 29.50 to 41.10 D) to 42.20 ± 3.50 D (range: 35.90 to 49.40 D) (*P*<.001). The corneas were statistically significantly steepened by an average of 5.50 D.

Preoperatively, 15 (88.2%) eyes had uncorrected visual acuity (UCVA) $\leq 20/200$. At last follow-up, 7 (41.2%) eyes attained UCVA $\geq 20/40$, 4 (23.5%) eyes between 20/50 and 20/80, and 6 (35.3%) eyes $\leq 20/100$. Contact lenses (n=4; 23.5%) or spectacles (n=6; 35.3%) were used to control postoperative ametropia.

The Table shows BSCVA before and after double concentric corneal suture. Seven (41.2%) eyes had improved their BSCVA by ≥ 2 lines. One (5.9%) eye lost 2 Snellen lines of BSCVA (Fig 4).

DISCUSSION

Refractive hyperopia is a significant complication after RK. The challenge of surgical reduction of hyperopia after RK remains one of the last frontiers in refractive surgery.^{1,3,4,7} It has been conclusively documented that a hyperopic shift from progressive corneal flattening can occur even after several years of emmetropia in a patient who underwent RK.² The PERK (Prospective Evaluation

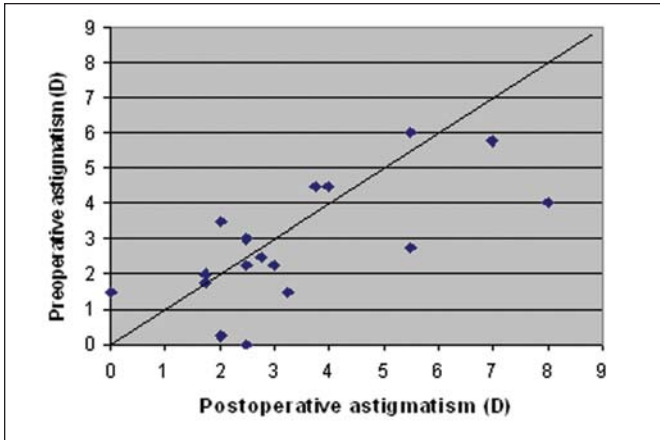


Figure 3. Scattergram of refractive astigmatism, preoperative versus last postoperative follow-up (n=17).

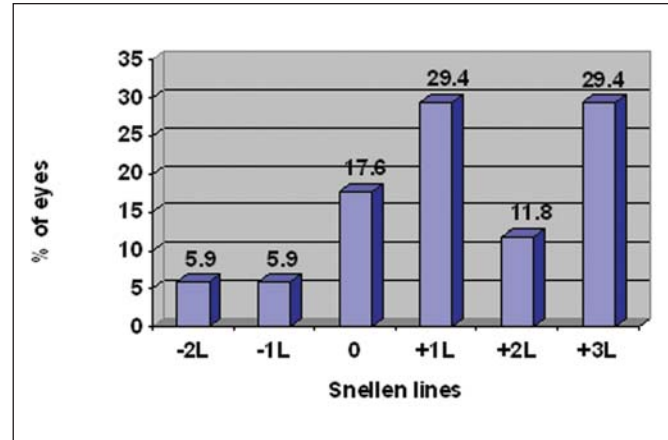


Figure 4. Change in best spectacle-corrected visual acuity, expressed as a gain or loss of Snellen lines, between baseline and 1 year after double concentric corneal suture (n=17).

TABLE

Change in Best Spectacle-corrected Visual Acuity From Baseline to 1 Year After Double Concentric Corneal Suture

Examination	No. of Eyes (%)		
	BSCVA (Snellen Chart)		
	≥20/20	20/25 to 20/40	≤20/50
Preoperative	0 (0)	10 (58.8)	7 (41.2)
Postoperative	3 (17.6)	8 (47.1)	6 (35.3)

BSCVA = best spectacle-corrected visual acuity

of Radial Keratotomy) study reported an increase in the percentage of eyes examined that had a hyperopic refractive error (overcorrection) >1.00 D at 5 and 10 years postoperatively from 17% to 23%, respectively.² This condition seems to be related to the chronic lack of corneal healing or to depth of the incisions. Our patients underwent RK an average 11.6 years (range: 7 to 18 years) prior to the study, so it is possible that some are still experiencing this hyperopic shift effect.

The appropriate management of RK-induced hyperopia is currently under discussion, and several surgical treatments have been reported recently.^{1,7,11-16} Surgical correction options have thus far focused on steepening the central cornea. Although LASIK can serve as an option for the correction of secondary overcorrected RK, it does not seem effective for high degrees of hyperopia or in cases with associated irregular astigmatism or open incisions.⁷ Corneal sutures can be used in an attempt to stabilize these corneas.^{3,4,8,9,17-19}

Several corneal suture techniques have already been described.^{3,4,9,17-20} Circular sutures, such as purse-string

or Grene Lasso, may be used to achieve a girdle effect on the cornea. Damiano et al^{17,18} described a double purse-string suture technique where the incisions were placed along the 5.0- and 7.0-mm optical zones. Alio and Ismail³ found that single purse-string suture at the 5.5-mm zone or radial suturing at the 7.5-mm zone was not enough to achieve the desired effect. They suggested combining both procedures.³ Grene⁴ originally described his suture as a single one at the 7.0-mm optical zone. Even the use of biologic tissue glue was proposed as an alternative to sutures to correct overcorrection after RK.²¹

In our study, two concentric corneal sutures, technically similar to the Grene Lasso procedure, were placed at the 7.0- and 9.0-mm zones (modified Grene Lasso suture), thus sparing the paracentral cornea and probably not increasing its irregularity.

A decreased refractive effect could be expected with the use of the 7.0-mm optical zone. However, our acquired change in refraction after double concentric corneal suture (modified Grene Lasso) (4.92 D) was greater than that found by Damiano et al¹⁸ (3.30 D) with the double purse-string suture. It is possible that the sinuous path of the Grene Lasso suture conveys significantly more posterior force to flatten the RK knee.⁴ This could allow a virtually unlimited amount of central corneal steepening. The addition of another suture at the 9.0-mm zone probably improved the results. To our knowledge, no other study reports the use of the double Grene Lasso suture for the treatment of hyperopia after RK.

Considering the known effect of intraocular pressure (IOP) on refraction and visual acuity after RK,²² we routinely prescribe topical prostaglandin analogs postoperatively. They act as adjuvant therapy lowering IOP, a possible cause of RK overcorrection, at least during the first postoperative month.

The ideal surgical plan is an initial overcorrection

or excessive tightening of the sutures, as there is a tendency toward regression with time. In this study, we observed an improvement in the spherical equivalent refraction from -2.81 ± 3.04 D at the first postoperative follow-up to -0.54 ± 2.59 D at last follow-up. The patient must be aware that an initial fluctuation of refraction and visual acuity occurs during the first postoperative months and that stabilization begins at 6 months, as demonstrated by Alio and Ismail.³

Even with the aid of the surgical keratoscope during the procedure we were unable to manage the refractive astigmatism successfully. Perhaps topographically guided radial incision suturing could improve the astigmatic outcome.³

Extremely flat corneas are generally related with worse levels of BSCVA. Preoperatively, none of our cases had BSCVA $\geq 20/20$ (Table). At last follow-up, 7 (41.2%) eyes improved their BSCVA by ≥ 2 lines (see Fig 4). This probably occurred due to the new prolate aspect of the cornea postoperatively documented by the steepening in average keratometry. With this new corneal configuration, some patients are able to refit their contact lenses or undergo photorefractive keratectomy with mitomycin C.

Our principal goal with this surgical approach was to improve the corneal asphericity and subsequently the patient's BSCVA. Double concentric corneal suture (modified Grene Lasso suture) appeared to be a good alternative for the reduction of hyperopic shift after RK in some cases.

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