

MANAGEMENT OF HYPEROPIC SHIFT AFTER RADIAL KERATOTOMY

CASE PRESENTATION

In 1983, a 42-year-old professional man presented with myopia and astigmatism of OD $-8.00 +2.00 \times 100$ and OS $-6.50 +1.50 \times 95$ and a history of difficulty wearing contact lenses and thick glasses. K-readings were OD $42.75 \times 180/44.00 \times 95$ and OS $42.50 \times 175/44.00 \times 90$. His corneal thickness was 560 to 570 μ centrally, 610 μ at the 3-millimeter zone and 780 to 800 μ at the 9-millimeter zone.

In March 1983, he underwent a 16-incision radial keratotomy in the left eye using a 3-millimeter clear zone. The initial incisions were made with a diamond blade carried centrifugally and deepened with a steel blade carried centripetally to a 7-millimeter zone. Two months later, a similar procedure was performed on the right eye.

Three months postoperatively, his refraction was OD $-1.50 +0.50 \times 165$ and OS plano sphere with uncorrected visual acuity of OD 20/40 and OS 20/20. At 6 months, his refraction was OD plano $+0.50 \times 170$ and OS plano, and at 1 year, he corrected to 20/20 with OD $+0.25 +1.00 \times 160$ and OS $+0.75$ sphere. At 2 years, his refractive error had changed to OD $+0.50 +0.75 \times 175$ and OS $+1.75$ sphere. In 1986, 3 years after surgery, his refraction was OD $+2.50 +3.00 \times 165$ and OS $+2.50 +1.50 \times 170$. By 1991, his hyperopia had increased to OD $+4.75 +3.25 \times 175$ and OS $+5.75 +1.00 \times 90$. The patient, a busy professional, is still bothered by fluctuation of vision requiring the use of several pair of glasses during the week. In view of this continued hyperopic shift, please give your analysis and recommendations based on your experience with similar cases.

Question provided by Spencer P. Thornton, MD

RESPONSES

The occurrence of progressive hyperopia and increasing against-the-rule astigmatism 3 to 5 years after radial keratotomy (RK) surgery, has been well documented by several investigators. The incidence of these two complications appears to increase the smaller the optical zone and the greater the number of incisions. It is also known that flattening of the cornea and increasing against-the-rule astigmatism also occur with aging in unoperated individuals, but to a much lesser degree. These phenomena following RK surgery most likely represent an acceleration of the normal structural change of the cornea.

The fluctuations in vision following RK surgery are due to an increase in the hydration of the cornea while sleeping, followed by a gradual reduction upon awakening. Ninety percent of this change occurs within the 1st 2 to 3 hours after awakening, and is accompanied by a shift toward myopia. The remaining 10% of the daily refractive change is often the most annoying to the patient and doctor, because this change is very gradual and may persist throughout the remainder of the day.

I usually give the patients two pair of glasses—"morning" and "afternoon" spectacles. These two different prescriptions are determined empirically by refracting the patient about 9:00 in the morning and again at 4:00 or 5:00 in the afternoon. If glasses provide unsatisfactory vision, then I recommend rigid gas permeable contact lenses. They are often difficult to fit due to the irregular corneal shape, but perseverance can yield an 80% success rate in these patients.

If the vision is unacceptable with glasses (usually less than 20/50) or a contact lens cannot be fitted or tolerated, a corneal transplant is recommended. I use an 8.00-millimeter recipient bed, an 8.25-millimeter donor button, and usually 16 radial 10-0 nylon interrupted sutures. If any of the remaining peripheral parts of the RK incisions can be opened easily, the exposed stromal edges are scraped free of epithelial cells and closed with tangential 10-0 nylon sutures. By 6 months after the corneal transplant procedure, most of the sutures have been removed. The patient then receives spectacles or a gas permeable lens. In my hands, approximately 50% of these patients need a rigid gas permeable lens to achieve stable 20/20 vision, while the other 50% wear spectacles. Almost none of the patients are able to have acceptable vision without either spectacles or contact lenses.

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