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Shawn M. Kelly

Pacific University

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We evaluated 44 patients totaling 64 eyes that had undergone photoastigmatic refractive keratectomy at Casey Eye Institute, Portland, Oregon for the correction of myopia and astigmatism. The mean entering manifest sphere was -4.11D, the mean cylinder was -1.54D. Forty-five eyes had with-the-rule astigmatism, fifteen had against-the- rule astigmatism, and four eyes had oblique astigmatism. The mean entering best corrected manifest visual acuity was 20/20+ 1. Patients with 6 months of follow-up care showed a mean sphere correction of +0.15D and a mean cylinder correction of -0.57D. The mean best corrected visual acuity was 20/20+ 1, and the mean uncorrected acuity was 20/20-2. These data show that there is a significant and accurate correction of myopic astigmatism with P.A.R.K., and that P.A.R.K. is an effective treatment for patients wanting to undergo vision correction surgery.

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Subject Categories

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THE SUCCESSFULNESS OF
PHOTOASTIGMATIC
REFRACTIVE KERATECTOMY

By

SHAWN M. KELLY

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Advisors:

Karl Citek, O.D., Ph.D., F.A.A.O.
Patrick Caroline, C.O.T., F.A.A.O.

Shawn M. Kelly

Karl Citek, O.D., Ph.D., F.A.A.O.

Patrick Caroline, C.O.T., F.A.A.O.

Biography

Shawn Michael Kelly

Born October 28, 1971 in Detroit Lakes, Minnesota. Was raised mostly in Pierre, South Dakota although, graduated from Mobridge High School in Mobridge, South Dakota. I Received a Bachelor of Science degree from the University of South Dakota where I was heavily involved with the local Lambda Chi Alpha fraternity. I was married on August 12, 1994 to my college sweetheart, Michelle Pray. We spent our honeymoon in a car traveling to Forest Grove for the beginning of a new life together.

Upon graduation and licensure I plan to become an associate at a private or group practice in a state east of the Rocky Mountains. Eventually I hope that an associate position will lead into partnership and finally ownership.

Abstract

We evaluated 44 patients totaling 64 eyes that had undergone photoastigmatic refractive keratectomy at Casey Eye Institute, Portland, Oregon for the correction of myopia and astigmatism. The mean entering manifest sphere was -4.11D, the mean cylinder was -1.54D. Forty-five eyes had with-the-rule astigmatism, fifteen had against-the-rule astigmatism, and four eyes had oblique astigmatism. The mean entering best corrected manifest visual acuity was 20/20+1.

Patients with 6 months of follow-up care showed a mean sphere correction of +0.15D and a mean cylinder correction of -0.57D. The mean best corrected visual acuity was 20/20+1, and the mean uncorrected acuity was 20/20-2.

These data show that there is a significant and accurate correction of myopic astigmatism with P.A.R.K., and that P.A.R.K. is an effective treatment for patients wanting to undergo vision correction surgery.

Key Words

Astigmatism

Manifest Refraction

Myopia

Photoastigmatic Refractive Keratectomy

Vision Correction Surgery

Visual Acuity

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Introduction

There are many options for surgical correction of myopia and astigmatism. Stein, Cheskes, and Stein (1995) describe the following procedures for correcting myopia and astigmatism in detail.

Among the earliest to be developed was radial keratotomy (RK). The procedure involves making small incisions into the anterior corneal surface from the limbus to a designated optical zone. The healing process then causes a flattening of the corneal surface correcting for the refractive error (Stein et al, pp. 137-139, Thornton pp. 1-11).

Astigmatism is corrected surgically in a procedure called astigmatic keratotomy (AK). The procedure is similar to RK with the addition of circumferential incisions to eliminate the astigmatic component of the refractive error. (Stein et al, p. 156, Thornton, pp. 73-88).

Automated Lamellar Keratectomy (ALK) is a procedure that utilizes a microkeratome to remove an outer section of cornea. A second pass of the microkeratome removes a predetermined amount of stromal mass which consequently flattens the cornea correcting for the refractive error (Stein et al, pp. 148-152).

Automated Lamellar Keratectomy combined with the Excimer laser (LASIK) is another procedure gaining popularity. This procedure combines the microkeratome of ALK and the Excimer laser to remove the corneal mass for optical correction (Stein et al, pp. 150-152).

A reversible procedure that does not remove corneal tissue is the use of Interstromal Corneal Rings (ICR). This procedure uses polymethylmethacrylate (PMMA) rings implanted in the peripheral cornea to selectively flatten or steepen the cornea (Stein et al, pp. 152-154).

Photorefractive Keratectomy (PRK) is a procedure that uses the Excimer laser to remove tissue from the anterior corneal surface. A surgical blade or the excimer laser is used to debride the epithelium from the corneal surface. Following debridement the excimer laser is used to remove a predetermined amount of stroma with greater ablation depth centrally to flatten the cornea and allow for optical correction (Stein et al, pp. 67-73).

Photoastigmatic Refractive Keratectomy (P.A.R.K.) is also a procedure that utilizes the excimer laser and corrects for astigmatism as well as myopia. The procedure is similar to PRK with a toric ablation used to correct for the astigmatism and give optical correction (Stein et al, pp. 95-99).

The rapid growth in interest of refractive surgery has led researchers to review the success of these surgeries. We decided to evaluate the success of photoastigmatic refractive keratectomy.

It is in the best interest of our patients for eyecare practitioners to be informed as to the outcomes of such procedures. With such information, practitioners can give their patients the best possible options for their vision care.

Methods

We evaluated 44 patients, 30 males and 14 females, 20 of whom received P.A.R.K. on both eyes, and the remaining 24 on a single eye only, giving a total of 64 eyes that had undergone P.A.R.K. at Casey Eye Institute, Portland, Oregon, for the correction of myopia and astigmatism. The mean age of the patients was 42.1 years, ranging from 23 to 52 years of age at the time of the first procedure. Data were available for 43 patients totaling 44 eyes at a one month follow-up visit where the manifest refraction as well as the best corrected and unaided visual acuities were compared to the pre-surgery data. Data for three and six month follow-ups were available for 44 and 34 patients totaling 59 and 40 eyes respectively.

The data gathered were entered into a personal computer in the form of a spreadsheet so that data analysis would be simplified. The number of eyes, the mean, standard deviation, standard error, and *t*-value were calculated for analysis. Each of the one, three, or six month follow-up data were compared to the entering manifest data. The recorded visual acuities were converted into logmar for analysis and re-converted to Snellen equivalents for presentation in this paper.

Results

The entering manifest sphere correction for all subjects was -4.11D, ranging from -0.50D to -7.50D. The entering mean cylinder correction was -1.54D, ranging from -1.00D to -4.00D. This gives a mean spherical manifest correction of -4.88D with a standard deviation of 1.59D. Forty-five eyes had with-the-rule astigmatism, fifteen had against-the-rule astigmatism, and four eyes had oblique astigmatism. The mean entering best corrected manifest visual acuity was 20/20+1. All subject data are included in Appendix 1.

The patients with a 1 month follow-up, totaling 44 eyes, showed a mean sphere correction of +0.57D, standard deviation of 0.60D, and a mean cylinder correction of -0.65D, standard deviation of 0.43D. The mean best corrected visual acuity was 20/20-1, and the mean uncorrected visual acuity was 20/25-1. In comparing the one month post treatment data with the manifest data we see a mean change in sphere power of +4.80D, standard deviation of 1.87D. In the cylindrical portion we see an increase in power of +0.89D, standard deviation of 0.62D. The cylinder axis changed in 34 eyes ranging from a five degree to a 90 degree change. The cylinder axis did not change following the procedure in eleven eyes. Using the t-test and a 0.05 level of significance, the t-value for the sphere change is 16.99 and for the cylinder change the value is 9.61. These values show a significant change in refractive error following one month post P.A.R.K.

The patients with 3 month data, totaling 59 eyes, showed a mean sphere correction of +0.30D, standard deviation of 0.63D, and a mean cylinder correction of -0.63D, standard deviation of 0.47D. The mean best corrected visual acuity was 20/20+1, and the mean uncorrected visual acuity was 20/20-2.

In comparing the three month post treatment data with the manifest data we see a mean change in sphere power of +4.30D, standard deviation of 1.93D. In the cylindrical portion we see and increase in power of +0.92D, standard deviation of 0.65D. The cylinder axis changed from their manifest axis in 46 eyes ranging from a three degree to a 90 degree change. The cylinder axis did not change in thirteen of the post three month eyes. Again using the t -test with a 0.05 significance level, we find the t -value for the sphere change is 17.45 and for the cylinder change the value is 10.78. These values show a significant change in refractive error following three months post P.A.R.K.

The patients with 6 month data, totaling 40 eyes, showed a mean sphere correction of +0.15D, standard deviation of 0.55D, a cylinder correction of -0.57D, standard deviation of 0.39D. The mean best corrected visual acuity was 20/20+1, and the mean uncorrected visual acuity was 20/20-2. In comparing the six month post treatment data with the manifest data we see a mean change in sphere power of +4.37D, standard deviation of 1.94D. In the cylindrical portion we see and increase in power of +0.88D, standard deviation of 0.58D. The cylinder axis changed from their manifest axis in 32 eyes ranging from a five degree to a 90 degree change. The cylinder axis did not change in eight of the post six month eyes. The t -value for the sphere change is 14.27 and for the cylinder change the value is 9.55. These values show a significant change in refractive error following six months post P.A.R.K. using a significance level of 0.05.

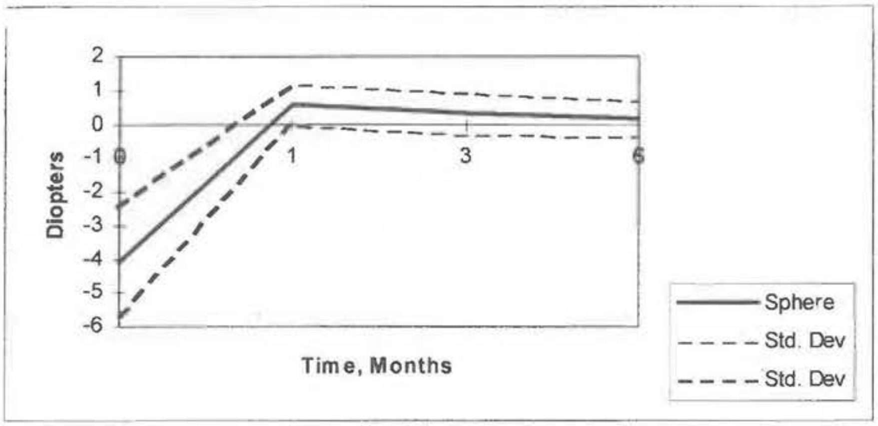

Figure 1.

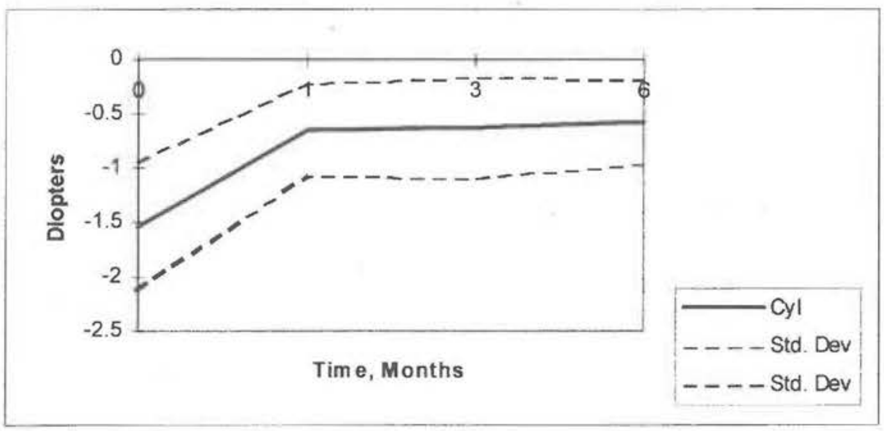

Figure 2.

Figures 1 and 2 show the changes in mean spherical and cylindrical correction, respectively, for all subjects.

Discussion

The findings show some interesting facts about the correction of myopic astigmats with photoastigmatic refractive keratectomy. The spherical correction of the first month follow-up seems to have a tendency to slip into the hyperopic range with a mean correction of +0.57D, standard deviation of 0.60D. On the other hand, the cylinder correction has a tendency to be undercorrected with a mean of -0.65D, standard deviation of 0.43D. The cylinder axis changed in 34 eyes ranging from a five degree to a 90 degree change. The cylinder axis did not change in eleven of the post one month eyes. The visual acuities for the one month follow-up show that on average, the best corrected visual acuity (BCVA) remains approximately 20/20, and on average the uncorrected visual acuity is 20/25+.

The spherical findings show a tendency to progress toward plano on the following three and six month follow-ups with +0.30D, standard deviation of 0.63D and +0.15D, standard deviation of 0.55D respectively. The cylindrical correction however, does not show an improvement during this time. These findings show that on average the cylindrical correction tends to remain with a mean of -0.60D, standard deviation of 0.47D for the three month, and -0.60D, standard deviation of 0.39D for the six month follow-ups.

The visual acuities show a BCVA of approximately 20/20+1 and an uncorrected visual acuity of 20/20-3 for the three month follow-up. The six month's data show a BCVA of 20/20+1, and an uncorrected visual acuity of approximately 20/20-3.

Although there is a small number of eyes and only six month follow-up data, these results clearly show that photoastigmatic refractive keratectomy is an effective procedure for the reduction of astigmatic myopia. The tendency for under correction of cylinder or the change in cylinder axis does not appear to have an adverse effect on visual acuities either aided or unaided.

Taylor, Kelly, and Alpins compared patients that had underwent P.A.R.K. with patients that had underwent P.R.K. It was found that an uncorrected visual acuity of 20/40 or better occurred in 72% of the P.A.R.K. group and 90% of the P.R.K. group at six month follow-up with only minor adverse reactions in 6% of the P.A.R.K. group and 11% in the P.R.K. group (Taylor et al, 1994).

Therefore, it is assumed that the long term outcome for patients undergoing photoastigmatic refractive keratectomy for the correction of myopia and astigmatism can be comparable to the long term outcomes of patients that underwent photorefractive keratectomy for the correction of myopia. It also would seem that the predictability of corrected and uncorrected visual acuity would decrease with increasing amounts of myopia and astigmatism (Taylor et al, 1996).

The capability of treating myopic astigmats is one of great importance to eyecare practitioners. Many people have an astigmatic portion to their refraction, and with the ability to accurately correct their astigmatism with refractive surgery, the door to uncorrected satisfactory visual acuity is open to everyone. P.A.R.K. gives eyecare practitioners a viable treatment option for myopic astigmats that is comparable to P.R.K. in accuracy and efficacy.

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Appendix 1.

Table 1. Manifest refraction and subject data for n=64 eyes pre-surgery.

subj	sph	cyl	axis	sph equil	VASnellen	logMAR
thb od	-4.00	-1.00	180	-4.500	16	-0.1
thb os	-4.50	-1.00	180	-5.000	16	-0.1
sbb os	-3.50	-4.00	10	-5.500	20	0
wmb od	-5.00	-1.00	90	-5.500	16	-0.1
hrc od	-4.00	-1.50	20	-4.750	16	-0.1
hrc os	-4.00	-1.50	180	-4.750	16	-0.1
dec od	-2.50	-1.00	120	-3.000	20	0
jmc od	-3.50	-1.00	75	-4.000	20	0
djb os	-2.00	-1.50	155	-2.750	16	-0.1
krb os	-7.25	-1.50	180	-8.000	25	0.1
jlb os	-3.50	-1.50	180	-4.250	20	0
mvb os	-2.00	-1.25	155	-2.625	16	-0.1
dab od	-2.75	-1.00	5	-3.250	16	-0.1
dab os	-2.75	-1.00	5	-3.250	20	0
dbr od	-3.50	-1.50	100	-4.250	16	-0.1
jra os	-6.00	-1.00	60	-6.500	20	0
cla od	-2.50	-1.25	135	-3.125	16	-0.1
jja od	-6.00	-1.25	5	-6.625	20	0
jja os	-6.00	-1.25	175	-6.625	16	-0.1
rjg os	-6.00	-1.50	20	-6.750	20	0
glg od	-0.50	-3.00	95	-2.000	16	-0.1
glg os	-0.50	-2.25	80	-1.625	20	0
lmh os	-7.50	-1.75	150	-8.375	25	0.1
jjh os	-3.50	-1.75	90	-4.375	32	0.2
lmh od	-2.50	-1.50	20	-3.250	25	0.1
lmh os	-2.75	-1.75	175	-3.625	25	0.1
dsh os	-5.00	-2.00	10	-6.000	20	0
mbh od	-6.50	-1.50	180	-7.250	20	0
mbh os	-6.00	-1.25	180	-6.625	16	-0.1
twh od	-4.50	-1.00	180	-5.000	20	0
twh os	-5.25	-1.25	180	-5.875	25	0.1
rlj od	-5.50	-1.75	180	-6.375	16	-0.1
rlj os	-5.00	-1.75	180	-5.875	16	-0.1
gsk os	-6.00	-1.00	180	-6.500	16	-0.1
kdk os	-7.00	-1.25	145	-7.625	20	0
jmk os	-6.50	-1.25	75	-7.125	20	0
sdk od	-2.25	-1.25	70	-2.875	20	0
sdk os	-1.50	-1.50	110	-2.250	16	-0.1
rem od	-3.50	-1.25	180	-4.125	20	0
rem os	-3.50	-1.25	180	-4.125	20	0
sjm od	-2.50	-1.25	10	-3.125	16	-0.1
sjm os	-2.50	-1.25	180	-3.125	16	-0.1
kbm od	-4.00	-1.25	170	-4.625	20	0
kbm os	-3.00	-1.50	20	-3.750	20	0
rdm od	-2.50	-2.50	175	-3.750	25	0.1
glm od	-6.00	-1.00	20	-6.500	20	0
glm os	-7.00	-2.00	150	-8.000	16	-0.1
emn od	-4.50	-1.00	180	-5.000	16	-0.1
emn os	-4.50	-1.00	180	-5.000	16	-0.1

lap os	-5.50	-1.00	180	-6.000	12	-0.2
paq od	-4.00	-2.50	85	-5.250	25	0.1
rsr od	-2.50	-1.75	85	-3.375	16	-0.1
rsr os	-3.00	-2.00	85	-4.000	20	0
tlr os	-4.00	-2.00	30	-5.000	12.5	-0.2
sks od	-2.00	-1.75	155	-2.875	20	0
sks os	-4.00	-1.25	155	-4.625	20	0
drs od	-3.50	-2.00	180	-4.500	20	0
drs os	-3.50	-1.50	175	-4.250	20	0
mmr os	-6.00	-3.50	180	-7.750	25	0.1
ces od	-4.75	-1.00	40	-5.250	16	-0.1
jls od	-4.50	-1.25	130	-5.125	20	0
jls os	-4.00	-1.25	100	-4.625	16	-0.1
pas od	-4.25	-2.00	165	-5.250	20	0
pas os	-4.50	-2.00	170	-5.500	20	0

Table 2. Refraction at 1-month post-surgery, n=44 eyes.

subj	sph	cyl	axis	sph equil	VASnellen	logMAR	VAsc	Vasc log
thb os	1.00	-0.50	10	0.750	16	-0.1	32	0.2
sbb os	0.50	-1.00	10	0.000	20	0	25	0.1
wmb od	1.00	-0.50	180	0.750	16	-0.1	16	-0.1
hrc os	0.00	-1.00	180	-0.500	16	-0.1	25	0.1
dec od	0.50	-0.50	20	0.250	20	0	25	0.1
jmc od	0.50	-0.50	180	0.250	20	0	20	0
djb os	0.75	-0.50	180	0.500	20	0	25	0.1
krb os	1.25	-1.00	180	0.750	20	0	25	0.1
jlb os	0.50	-0.50	180	0.250	20	0	25	0.1
mvb os	0.00	0.00	0	0.000	16	-0.1	16	-0.1
dab os	0.75	-0.50	180	0.500	20	0	25	0.1
dbr od	1.50	-0.50	180	1.250	20	0	20	0
jra os	0.50	-0.50	180	0.250	20	0	20	0
cla od	-1.25	-0.50	180	-1.500	16	-0.1	25	0.1
jja os	0.50	-0.50	180	0.250	16	-0.1	20	0
rjg os	1.25	-0.75	180	0.875	20	0	32	0.2
glg os	-0.50	-3.00	95	-2.000	16	-0.1	63	0.5
lmh os	1.25	-0.75	180	0.875	32	0.2	32	0.2
jjh os	0.75	-1.00	180	0.250	32	0.2	50	0.4
lmh os	0.75	-0.50	90	0.500	20	0	32	0.2
dsh os	0.75	-0.75	15	0.375	20	0	20	0
mbh os	-0.50	-0.50	180	-0.750	32	0.2	40	0.3
twh os	0.75	-0.50	180	0.500	25	0.1	32	0.2
rlj os	0.50	-0.50	180	0.250	16	-0.1	16	-0.1
gsk os	-1.00	-0.50	180	-1.250	20	0	25	0.1
kdk os	0.75	-1.25	180	0.125	25	0.1	25	0.1
jmk os	1.25	-0.50	180	1.000	20	0	25	0.1
sdk os	0.50	0.00	0	0.500	16	-0.1	16	-0.1
rem os	0.00	-0.50	180	-0.250	20	0	20	0
sjm od	0.50	-0.75	180	0.125	16	-0.1	25	0.1
kbm od	1.25	-0.50	180	1.000	20	0	20	0
rdm od	1.00	-0.50	180	0.750	63	0.5	80	0.6
glm od	1.25	-0.50	180	1.000	20	0	40	0.3
emn od	0.50	-0.50	180	0.250	20	0	20	0
paq od	0.50	-0.75	180	0.125	35	0.2	63	0.5

rsr os	0.75	-0.50	180	0.500	16	-0.1	25	0.1
tlr os	0.50	-0.50	10	0.250	16	-0.1	25	0.1
sks os	1.00	-0.50	180	0.750	25	0.1	20	0
drs os	-0.50	-0.75	180	-0.875	25	0.1	25	0.1
mmr os	1.50	-1.00	180	1.000	25	0.1	63	0.5
ces od	1.00	-0.50	30	0.750	20	0	25	0.1
jls od	0.50	-0.75	180	0.125	20	0	25	0.1
jls os	0.50	-0.50	180	0.250	20	0	20	0
pas od	0.50	-0.75	180	0.125	20	0	20	0

Table 3. Refraction at 3-months post-surgery, n=59 eyes.

subj	sph	cyl	axis	sph equil	VASnellen	logMAR	VAsc	Vasc log
thb od	0.50	-0.50	180	0.250	12.5	-0.2	12.5	-0.2
thb os	0.50	-1.00	5	0.000	16	-0.1	25	0.1
sbb os	0.50	-1.00	180	0.000	20	0	25	0.1
wmb od	1.00	-0.50	180	0.750	16	-0.1	20	0
hrc os	0.00	-1.00	180	-0.500	16	-0.1	20	0
dec od	0.00	-0.50	20	-0.250	20	0	25	0.1
jmc od	0.00	-0.50	180	-0.250	16	-0.1	16	-0.1
djb os	1.00	0.00	0	1.000	20	0	25	0.1
krb os	0.00	-1.00	180	-0.500	20	0	25	0.1
jlb os	0.00	-0.75	5	-0.375	20	0	20	0
mvb os	0.00	-0.50	180	-0.250	12.5	-0.2	16	-0.1
dab od	-0.50	-0.50	90	-0.750	16	-0.1	25	0.1
dab os	0.50	-0.50	5	0.250	16	-0.1	20	0
dbr od	1.50	-1.25	25	0.875	16	-0.1	20	0
jra os	0.00	0.00	0	0.000	16	-0.1	16	-0.1
cla od	-0.50	-0.50	180	-0.750	20	0	20	0
jja os	0.00	-0.50	180	-0.250	16	-0.1	16	-0.1
rjg os	1.25	-0.50	180	1.000	20	0	20	0
glg od	-1.50	-1.00	175	-2.000	20	0	25	0.1
glg os	-0.50	-3.00	95	-2.000	16	-0.1	63	0.5
lmh os	0.50	-0.50	90	0.250	20	0	20	0
jjh os	1.50	-0.50	162	1.250	40	0.3	50	0.4
lmh od	0.50	0.00	0	0.500	20	0	20	0
lmh os	0.50	-0.50	90	0.250	20	0	20	0
dsh os	0.00	-1.00	15	-0.500	20	0	25	0.1
mbh od	0.00	-1.25	3	-0.625	16	-0.1	20	0
mbh os	0.75	-1.25	165	0.125	12.5	-0.2	25	0.1
twh os	0.50	-0.50	180	0.250	16	-0.1	20	0
rlj od	0.50	-0.50	90	0.250	12.5	-0.2	12.5	-0.2
rlj os	0.50	-0.50	180	0.250	16	-0.1	20	0
gsk os	1.00	0.00	0	1.000	20	0	20	0
kdk os	0.50	-0.50	180	0.250	20	0	20	0
jmk os	1.25	-0.50	180	1.000	20	0	20	0
sdk od	1.00	-0.50	90	0.750	16	-0.1	20	0
sdk os	0.25	0.00	0	0.250	16	-0.1	25	0.1
rem od	-0.50	-0.50	170	-0.750	16	-0.1	20	0
rem os	-0.25	-0.50	180	-0.500	20	0	20	0
sjm od	0.00	-1.00	20	-0.500	20	0	25	0.1
sjm os	0.50	-0.50	45	0.250	12.5	-0.2	20	0
kbm od	1.00	-0.75	30	0.625	25	0.1	20	0
kbm os	-0.50	-1.00	60	-1.000	16	-0.1	32	0.2

rdm od	0.25	-0.75	175	-0.125	25	0.1	25	0.1
glm od	1.75	-0.75	180	1.375	16	-0.1	40	0.3
glm os	0.00	-0.25	170	-0.125	16	-0.1	20	0
emn od	0.00	-1.00	180	-0.500	20	0	25	0.1
emn os	0.00	-0.75	180	-0.375	25	0.1	25	0.1
lap os	0.75	-0.50	180	0.500	16	-0.1	20	0
paq od	0.50	-1.25	180	-0.125	25	0.1	32	0.2
rsr os	0.50	-0.50	90	0.250	16	-0.1	20	0
tlr os	0.50	-0.50	125	0.250	16	-0.1	16	-0.1
sks od	0.50	-0.50	180	0.250	20	0	20	0
sks os	0.50	-0.50	180	0.250	25	0.1	25	0.1
drs od	-1.00	-0.75	10	-1.375	20	0	50	0.4
drs os	-0.75	-0.25	90	-0.875	32	0.2	32	0.2
mmr os	0.50	-0.50	180	0.250	20	0	25	0.1
ces od	-1.00	-0.50	30	-1.250	16	-0.1	20	0
jls os	0.00	0.75	20	0.375	16	-0.1	25	0.1
pas od	0.50	-0.75	175	0.125	16	-0.1	20	0
pas os	1.00	-0.75	180	0.625	25	0.1	50	0.4

Table 4. Refraction at 6-months post-surgery, n=40 eyes.

subj	sph	cyl	axis	sph equil	VASnellen	logMAR	VAsc	Vasc log
thb os	0.50	-1.00	80	0.000	12.5	-0.2	32	0.2
wmb od	1.00	-0.50	180	0.750	16	-0.1	16	-0.1
hrc od	0.00	-0.75	15	-0.375	16	-0.1	20	0
hrc os	0.00	-1.25	170	-0.625	16	-0.1	20	0
jmc od	0.00	-0.50	180	-0.250	16	-0.1	16	-0.1
krb os	1.00	-1.75	170	0.125	16	-0.1	25	0.1
jlb os	0.00	-1.00	165	-0.500	20	0	25	0.1
dab os	0.00	-1.00	180	-0.500	12.5	-0.2	16	-0.1
dbr od	1.00	-1.25	30	0.375	20	0	25	0.1
jra os	0.50	-0.50	15	0.250	20	0	16	-0.1
cla od	0.00	0.00	0	0.000	20	0	20	0
jja od	0.00	0.00	0	0.000	20	0	20	0
jja os	0.00	-0.50	180	-0.250	16	-0.1	20	0
rjg os	1.50	0.00	0	1.500	20	0	32	0.2
glg od	-0.50	-0.75	180	-0.875	25	0.1	32	0.2
glg os	-0.50	-1.00	175	-1.000	20	0	25	0.1
lmh os	0.50	-0.75	180	0.125	32	0.2	25	0.1
lmh os	0.50	-0.50	180	0.250	20	0	20	0
mbh os	-0.50	-0.75	180	-0.875	16	-0.1	25	0.1
twh od	0.50	-0.75	180	0.125	20	0	26	0.1
twh os	0.00	-0.25	180	-0.125	20	0	20	0
rlj os	0.00	-0.50	80	-0.250	12.5	-0.2	16	-0.1
gsk os	-0.50	-0.50	180	-0.750	20	0	20	0
jmk os	0.50	-0.50	180	0.250	25	0.1	25	0.1
sdk os	0.00	-0.50	90	-0.250	12.5	-0.2	16	-0.1
rem os	-0.50	-0.75	180	-0.875	16	-0.1	20	0
sjm od	0.00	-0.50	30	-0.250	16	-0.1	16	-0.1
kbm od	1.00	-0.75	10	0.625	16	-0.1	16	-0.1
rdm od	0.00	-0.50	130	-0.250	25	0.1	25	0.1
glm od	1.00	0.00	0	1.000	16	-0.1	25	0.1
emn od	0.50	-0.75	180	0.125	16	-0.1	25	0.1
emn os	0.00	-0.50	180	-0.250	16	-0.1	20	0

lap	os	0.00	0.00	0	0.000	16	-0.1	16	-0.1
paq	od	0.00	-0.50	180	-0.250	25	0.1	25	0.1
rsr	od	-1.50	0.00	0	-1.500	16	-0.1	63	0.5
rsr	os	0.00	0.00	0	0.000	20	0	20	0
sks	os	-0.50	0.00	0	-0.500	20	0	25	0.1
drs	os	0.50	-0.50	165	0.250	20	0	25	0.1
jls	os	0.00	-0.50	180	-0.250	16	-0.1	20	0
pas	od	0.00	-0.75	180	-0.375	16	-0.1	20	0