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LONG TERM RESULTS OF MYOPIC KERATOMILEUSIS - 1982

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This paper presents the statistical results of 23 myopic keratomileusis procedures (KMM), performed in 19 patients, with an average followup of 9.29 years (range: 2 - 20. 75 years). Since the statistics were gathered from patients who came voluntarily for followup controls between july 2 and december 18, 1982, they represent a random study.

In table I, the cases are numbered by the order in which they were examined. The average results of this table show that although a correction of - 9. 60 D was requested for the correction of an ametropia of - 9. 74 D (0. 14 D of undercorrection), 1 month postoperatively there was an overcorrection of 0. 06 D. This means that there was an overcorrection of 0.08 D in relation to the correction requested. Between this time (1 month postop) and the end of the first postoperative year, the correction obtained was reduced 15.42%, due to the reduction of the edema along the edges of the lenticule.

After the first year, the correction was more stable. The study shows that at the end of the average followup period (9.29 years) the progression of the myopia was 1.85 D; in other words, 0.22 D per year (2.02%).

On the other hand, the non operated eye had an average myopia of -0.63 D, which progressed 0.12 D per year (19.56%) (Table V).

Contrary to what happens in the short term results (2), in the long term results the visual acuity improves in cases of relative amblyopia as well as in those with satisfactory preoperative vision. Table I shows the cases of the study, classified by preoperative visual acuities higher than and lower than 0.40. Here, we can see

Table I

RESULTS OF KERATOMILEUSIS FOR THE CORRECTION OF MYOPIA

			PREOPERATIVE			1 MONTH		1YEAR		LATE		
C. R. #	Case #	Age	Sph / equiv	C / VA	De request.	Sph / equiv	C / VA	Sph / equiv	C / VA	Years	Sph / equiv	C / VA
272533	1	36.00	-9.75	0.50	-12.00	+5.75	0.40	+2.50	0.45	4.00	+1.75	0.67
272533	2	36.00	-9.25	0.67	-9.72	-1.25	0.50	-2.75	0.67	2.75	-1.25	0.67
251928	3	8.00	-5.75	0.10	-5.75	0.00	0.62	0.00	0.62	13.00	-2.00	0.67
120890	4	6.00	-6.37	0.80	-7.00	+3.25	0.45	+1.13	0.80	5.00	+0.75	1.00
88113	5	12.00	-7.25	0.10	-8.00	+3.67	0.50	-0.25	0.40	6.25	-1.50	0.40
55344	6	42.00	-8.00	0.70	-8.50	0.00	0.67	-0.25	0.67	11.42	-1.50	0.60
129355	7	38.00	-12.67	0.33	-11.00	+0.25	0.20	+0.13	0.50	3.75	+0.25	0.50
129355	8	38.00	-15.50	0.33	-13.00	-0.87	0.30	0.00	0.20	3.75	+1.25	0.25
282061	9	25.00	-8.62	1.00	-8.00	+2.37	0.80	+1.25	1.00	2.25	+2.50	0.80
282061	10	25.00	-13.25	0.80	-11.48	+1.00	0.67	+0.25	1.00	2.83	-1.75	0.80
54522	11	17.00	-5.50	0.67	-5.25	+1.25	0.40	+1.75	0.40	12.42	+0.50	0.50
60036	12	12.00	-8.25	0.15	-8.00	-3.25	0.15	-2.00	0.30	17.75	-7.36	0.33
209551	13	6.00	-12.75	0.05	-14.00	-4.50	0.05	-4.50	0.50	20.75	-5.12	0.40
261081	14	9.00	-6.00	0.25	-7.50	-0.25	0.29	-2.38	0.50	8.25	-5.75	0.50
256464	15	16.00	-13.67	0.40	-11.00	-0.75	0.50	-7.50	0.67	11.00	-12.00	0.45
203327	16	6.00	-7.50	0.20	-11.00	-0.12	0.15	-3.37	0.67	11.00	-3.75	0.80
282844	17	37.00	-18.37	0.10	-15.00	-0.37	0.50	-0.50	0.67	2.58	-0.62	0.67
206538	18	17.00	-15.75	0.10	-17.00	-7.37	0.10	-7.00	0.10	11.50	-14.25	0.10
85247	19	14.00	-4.50	0.33	-4.50	+0.87	0.33	+0.50	0.67	8.00	+0.50	1.00
203330	20	20.00	-6.75	0.29	-6.26	+0.25	0.50	-1.75	0.80	13.00	-7.25	0.80
63119	21	23.00	-13.00	0.40	-11.87	-0.75	0.40	-5.75	0.50	15.25	-11.37	0.70
63119	22	23.00	-10.75	0.25	-10.00	-0.25	0.40	-4.00	0.80	14.67	-8.12	0.80
63532	23	20.00	-4.75	1.00	-5.00	-0.25	1.00	+0.25	1.00	12.50	-0.75	1.00
AVERAGES		21.31	-9.74	0.41	-9.60	-0.06	0.34	-1.49	0.60	9.29	-3.34	0.63
With VA< 0.4		18.46	-10.14	0.20	-10.08	-0.92	0.31	-1.93	0.52	10.33	-4.13	0.56
With VA> 0.4		24.60	-9.22	0.69	-8.98	+1.06	0.58	-0.91	0.72	7.94	-2.31	0.72

that the group with preoperative visual acuities higher than 0.40 had an average preoperative visual acuity of 0.69, which increased to 0.72 at the end of the followup period, and that the group with preoperative visual acuity lower than 0.40 had an average vision of 0.20, which increased to 0.56 at the end of the followup period.

These findings confirm our previous belief in the fact that the improvement of the visual acuity persists during the postoperative period, even in spite of a myopia increase, so long as there are no myopic sclerocoroidosis lesions. These, however, have not been observed in any of the cases included in the present study.

The statistics of this study are really a complement of those gathered in 1980 - 1981 (2). At that time, the visual acuity of cases with a preoperative vision lower than 0.40 improved with the surgery, and the decrease in visual acuity of cases with a preoperative vision higher than 0.40 was 0.15, 8.7 months postoperatively and 0.04, 14.63 months after the surgery. The present study shows the same results in cases with preoperative vision lower than 0.40, but a definitive average improvement in cases with more than 0.40, at the end of the 9.29 years of followup.

In the present series, the evolution of the visual acuity was:

	Uncorrected	**Corrected**
Preop	0.03	0.41
1 month	0.25	0.43
1 year	0.29	0.60
9.29 years	0.27	0.63

Table II shows the cause for the myopia progression in the eyes operated. Here we see that at the end of the followup period the axial length of the ocular globe increased 1.72 mm. and the corneal curvature became 0.13 mm. steeper in patients under 21 years of age, while in older patients the axial length increased only 1.02 mm. and the corneal curvature remained stable.

The general average shows that during the 9.29 year followup the axial growth was 1.40 mm. and the corneal steepening was 0.44 mm. When converted into diopters, these data show that 2.72 D were due to axial growth, while only 1.85 D were due to corneal steepening (in other words, by loss of surgical effect). The distribution of these figures by the yearly evolution shows that 0.20 D per year were due to a loss of correction and 0.29 D per year to an increase of the axial length. This, again, agrees with previous statistics [1]. However, the fact that

Table II

K M M 1982 - GROUPED BY AGE

CR #	Case #	Age	Axial length	RF obtained (1 year)	Followup (years)	RF	Axial length	Change in RF	Axial growth	Ametropia Preop	Ametropia Postop.	
120890	4	6	25.10	9.25	5.00	9.72	26.16	+0.47	1.06	-6.37	+0.75	
209551	13	6	24.00	8.17	20.75	8.00	25.75	-0.17	1.75	-12.75	-5.12	
203327	16	6	24.00	9.35	11.00	9.25	28.10	-0.10	4.10	-7.50	-3.75	
251928	3	8	23.50	8.33	13.00	8.67	24.00	+0.34	0.50	-5.75	-2.00	
261081	14	9	23.25	8.18	8.25	7.98	25.74	-0.20	2.49	-6.00	-5.75	
60036	12	12	---	8.40	17.75	8.00	---	-0.40	---	-8.25	-7.76	
88113	5	12	25.50	9.00	6.25	8.90	25.98	---	0.48	-7.25	-1.50	
85247	19	14	22.00	9.00	8.00	8.92	23.00	-0.08	1.00	-4.50	+0.50	
256464	15	16	27.50	8.40	11.00	8.07	29.66	-0.33	2.16	-13.67	-12.00	
206538	18	17	29.00	9.15	11.50	8.55	30.00	-0.60	1.00	-15.75	-14.25	
54522	11	17	25.50	10.25	12.42	10.25	26.00	0.00	0.50	-5.50	+0.50	
203330	20	20	24.45	9.31	13.00	8.90	29.00	-0.41	4.55	-6.75	-7.25	
63532	23	20	22.00	8.15	12.50	8.02	23.00	-0.13	1.00	-4.75	-0.75	
63119	22	23	23.45	-	14.67	7.95	26.00	-	2.55	-10.75	-8.12	
63119	21	23	24.95	8.07	15.25	7.95	27.00	-0.12	2.05	-13.00	-11.37	
282061	9	25	26.10	9.80	2.25	9.25	25.86	-0.55	-0.24	-8.62	+2.50	
282061	10	25	27.13	9.75	2.83	9.45	26.74	-0.30	-0.39	-13.25	-1.75	
272533	2	36	27.15	8.00	2.75	8.17	27.50	+0.17	0.35	-9.25	-1.25	
272533	1	36	27.30	10.12	4.00	10.38	28.80	+0.26	1.50	-9.75	+1.75	
282844	17	37	28.27	9.62	2.58	9.70	31.58	+0.08	3.31	-18.37	-0.62	
129355	8	38	27.21	9.00	3.75	9.50	27.43	+0.50	0.22	-15.50	+1.25	
129355	7	38	27.39	8.96	3.75	9.20	26.77	+0.24	-0.62	-12.67	+0.25	
55344	6	42	26.00	8.75	11.42	8.75	27.47	0.00	1.47	-8.00	-1.50	
GENERAL AVERAGE		21.13	25.49	8.96	9.29	8.85	26.89	-0.06	1.40	-9.74	-3.36	TOTAL
Average < 21 years		12.54	24.65	8.84	11.57	8.71	26.37	-0.13	1.72	-8.06	-4.49	< than 21
Average > 21 years		30.50	26.09	9.02	6.89	8.94	27.10	+0.02	1.02	-11.26	-1.89	> than 21

the final radius 1 year postoperatively is 8.96 mm, while 9.29 years postoperatively it is 8.85 mm, shows that the results of the surgery are more stable after the first year. Therefore, the loss of curvature is 0.11 mm 8.29 years postoperatively, which is equal to 0.54 D in the cornea, or 0.065 D per year.

Consequently, if the progression is 1.85 D in 8.29 years and, if of these only 0.54 D are due to corneal steepening, the remaining 1.31 D must be due to axial growth and not to a lack of stability of the procedure after the first year.

The classification of patients into groups with more than and less than 10 D of myopia shows that the average age of the former is 22.89 years, while the average age of the latter is only 16.21 years.

Table III shows that the astigmatism, which was 1.95 D (-0.50 to -5.25) before the surgery, improved to 1.72 D (0.00 to -5.00) 1 year postoperatively and went

Table III

ASTIGMATISM

Case #	Preop (cyl)	1 mo (cyl)	12 mos (cyl)	Followup (years)	Late (cyl)	Change in axis	C/VA
15	-5.25	-5.00	-5.00	11.00	-2.00	5.00	0.45
13	-3.50	-2.00	-2.00	20.75	-2.25	25.00	0.40
5	-3.50	-1.25	-2.25	6.25	-3.00	15.00	0.40
20	-3.50	-1.50	-1.50	13.00	-4.00	5.00	0.80
6	-3.00	-2.50	-2.50	11.42	-2.50	10.00	0.60
9	-2.75	-2.25	-2.50	2.25	-2.00	20.00	0.80
18	-2.50	-1.25	-2.00	11.50	-2.50	20.00	0.10
10	-2.50	0.00	-1.50	2.83	-1.50	55.00	0.80
8	-2.00	-0.75	0.00	3.75	-0.50	5.00	0.25
1	-2.00	-1.25	-2.50	4.00	-0.50	70.00	0.67
14	-2.00	-2.00	-1.75	8.25	-2.50	10.00	0.50
12	-1.50	-0.50	-1.00	17.75	-2.75	20.00	0.33
2	-1.50	-1.50	-1.00	2.75	-2.50	10.00	0.67
21	-1.50	-2.50	-3.50	15.25	-4.24	0.00	0.70
22	-1.50	-0.50	-3.00	14.67	-2.25	0.00	0.80
16	-1.00	-0.75	-0.75	11.00	-2.50	10.00	0.80
11	-1.00	0.00	-1.50	12.42	-2.00	30.00	0.50
19	-1.00	-0.75	-1.00	8.00	-1.00	0.00	1.00
17	-0.75	-0.75	-1.25	2.58	-1.25	25.00	0.67
7	-0.75	-0.50	-0.75	3.75	-0.50	20.00	0.50
4	-0.75	-1.50	-0.75	5.00	-1.50	50.00	1.00
3	-0.50	-1.00	-1.00	13.00	-1.00	85.00	0.67
23	-0.50	-0.50	-0.50	12.50	-1.00	0.00	1.00
AVERAGES	-1.95	-1.33	-1.72	9.29	-1.99		0.63
Change in astigmatism		-0.66	-0.23		+0.04		

back to 1.99 D (-0.50 to -4.00) 9.29 years postoperatively (almost the same preoperative figures).

Table IV registers the cases by preoperative axial lengths of more than and less than 27.00 mm. The first group had an average preoperative axial length of 27.62 mm, which progressed 0.97 mm. during the course of 5.27 years. The second group had an axial length of 24.27 mm, which progressed 1.66 mm. in 10.98 years. This amounts to 0.184 mm. per year in the first group and to 0.151 mm. per year in the second group and shows that the globes that are more elongated have a higher tendency towards myopic growth than less distended eyes. It should be noted that the first group includes cases No. 15 and 21, which had a postoperative myopia that was very similar to the preoperative myopia, but kept the preoperative visual acuity.

Table IV

AXIAL LENGTH OF THE GLOBE

	PREOPERATIVE			LATE POSTOPERATIVE			
Case #	C / VA	Axial length	Sph. equiv.	Followup (years)	C / VA	Sph. equiv.	Axial length
17	0.10	28.27	-18.37	2.58	0.67	-0.62	31.58
15	0.40	27.50	-13.67	11.00	0.45	-12.00	29.66
7	0.33	27.39	-12.67	3.75	0.50	+0.25	26.77
1	0.50	27.30	-9.75	4.00	0.67	+1.75	28.80
8	0.33	27.21	-15.50	3.75	0.25	+1.25	27.43
2	0.67	27.15	-9.25	2.75	0.67	-1.25	27.50
10	0.80	27.13	-13.25	2.83	0.80	-1.75	26.74
9	1.00	26.10	-8.62	2.25	0.80	+2.50	25.86
6	0.70	26.00	-8.00	11.42	0.60	-1.50	27.47
5	0.10	25.50	-7.25	6.25	0.40	-1.50	25.98
11	0.67	25.50	-5.50	12.42	0.50	+0.50	26.00
4	0.80	25.10	-6.37	5.00	1.00	+0.75	26.16
21	0.40	24.95	-13.00	15.25	0.70	-11.37	27.00
20	0.29	24.45	-6.75	13.00	0.80	-7.25	29.00
16	0.20	24.00	-7.50	11.00	0.80	-3.75	28.10
13	0.05	24.00	-12.75	20.75	0.40	-5.12	25.75
3	0.10	23.50	-5.75	13.00	0.67	-2.00	24.00
22	0.25	23.45	-10.75	14.67	0.80	-8.12	26.00
14	0.25	23.25	-6.00	8.25	0.50	-5.75	25.74
19	0.33	22.00	-4.50	8.00	1.00	+0.50	23.00
23	1.00	22.00	-4.75	12.50	1.00	-0.75	23.00
AVERAGES	0.41	25.49	-9.74	9.29	0.63	-3.34	26.89
Ax. length < 27	0.44	24.27	-7.68	10.98	0.71	-3.06	25.93
Ax. length > 27	0.40	27.62	-13.63	5.27	0.51	-3.33	28.56

The evolution of the postoperative corneal radius (Rf), myopia and axial length was:

	Radius	Myopia	Axial length (mm)
Initial	7.62	-9.74	25.49
Rf and Dc Requested	9.74	-9.60	
1 month postop.	9.31	-0.06	
1 year postop.	8.96	-1.49	
9.29 years	8.85	-3.36	26.89

Worthy to be noted is the fact that although the initial radius corresponds to 43.56 D and the final radius corresponds to 37.51 D (in other words, to a correction of 6.04 D), the correction obtained was 6.40 D, in spite of the axial growth.

This disagreement between the corneal and refractive changes should be studied more throughly, in order to find its cause, because it also occurs in hypermetropic keratomileusis, in which there was no accurate correlation between the keratometric and refractive modifications.

Table V gathers the evolution of the ametropia during 11.56 years, in the non operated eye of the patients of the study. This evolution was:

	Preop.	Late	Change in 11.56 years
Spherical	-0.14	-1.34	1.20 D
Cylindrical	-0.98	-1.43	0.45 D
Corneal radius	7.84	7.80	0.04 mm
Axial length	22.68	24.43	1.75 mm
Spherical equivalent	-0.63	-2.05	1.42 D

The calculation of the previous and late refraction with the corneal radius and axial length shows a difference of 5.31 D. Since the resulting myopia is only 2.05 D, we suspect there is a factor that compensates for the remaining 3.26 D, originating probably in the lens (deepening of the anterior chamber?).

Table V

MYOPIA EVOLUTION IN THE NON OPERATED EYE

	FIRST EXAMINATION							LAST EXAMINATION					
Case #	**Sph.**	**Cyl.**	**Axis**	**VA**	**RI**	**Axial length**	**Followup (years)**	**Sph.**	**Cyl.**	**Axis**	**VA**	**Axial length**	**RF**
3	0.50	0.00		1.00	7.59		13.00	0.00	-0.50	180.00	1.00		8.09
4	-1.50	-1.00	180.00	0.80	7.86		5.00	-4.50	-0.75	180.00	0.80	24.72	7.95
5	-1.00	-1.00	180.00	0.80	7.86		6.25	-2.25	-2.00	5.00	1.00		
6	0.50	-0.75	180.00	1.00	7.70	23.00	11.42	0.00	-2.25	170.00	1.00	23.48	7.61
11	0.00	-3.00	120.00	0.40	8.00	25.00	12.42	-2.00	-4.00	180.00	0.20	26.00	7.70
12	0.00	-0.25	180.00	1.00	7.70		17.75	-2.00	-1.50	10.00	1.00		
13	1.00	-2.75	180.00	0.80	7.22	21.50	20.75	-1.50	-2.00	180.00	1.00		7.22
14	0.00	0.00		1.00	7.59	21.25	8.25	-0.50	-0.50	165.00	1.00	23.50	7.70
15	0.25	-3.25	165.00	1.00	7.70	22.25	11.00	-1.50	-2.50	165.00	1.00		7.59
16	-0.75	0.00		1.00	8.24	22.00	11.00	-1.75	0.00		1.00	25.16	8.25
18	0.00	-1.25	5.00	1.00	8.19	24.00	11.50	0.00	-2.25	15.00	0.80		8.00
19	0.50	0.00		1.00	8.12		8.00	0.00	0.00		1.00		8.04
20	-1.25	0.00		1.00	8.29	23.14	13.00	-2.50	-0.50	10.00	1.00	26.05	
23	-0.25	-0.50	180.00	1.00	7.66	22.00	12.50	-0.25	-1.25	15.00	0.80	22.10	7.64
AVERAGE	-0.14	-0.98		0.91	7.84	22.68	11.56	-1.34	-1.43		0.90	24.43	7.80

In 14 cases, the stereopsis was examined for near vision with the fly test. The results were:

Case No.	Seconds of arc	Case No.	Seconds of arc
5	800	15	800
6	100	16	100
9	40	17	800
10	40	19	Absent
12	200	20	400
13	200	21	60
14	100	22	40

Due to the differences in followup, the surgical technique used in this series was not uniform. Therefore, in most cases the comparison of the different parameters does not produce sufficiently homogenous results to be of value. Only the classification of the results by thickness and diameter of corneal disc resected shows a congruence between the thickness and diameter of the disc and the degree of correction obtained (Table VII).

Although the followup of the groups under comparison differs greatly, this study shows that discs 0.30 mm. thick and 7.25 mm. in diameter provide the most stable results.

The surgical parameters used in this series were the following:

	Averages	Extreme values
Radius of base	8.17	7.00 to 9.67
Diameter of the disc	7.56	6.75 to 8.25
Ed	0.28	0.25 to 0.38 (0.38 in Case No.12)
Ep	0.31	0.20 to 0.40
Rt	5.93	4.27 to 7.71
Ec'	0.12	0.09 to 0.21 (0.21 in Case No.9)

In Table VI the results are gathered by Ed. In this table we can see that the best thickness ranges between 0.30 and 0.33 mm. Greater thicknesses lead to low corrections (because the posterior corneal layers adapt to the anterior layers), and smaller thicknesses provide less stability. The following are the averages obtained in Table VI.

Relation between Ed and correction

Ed (mm)	Correction (diopters)	Correction %
0.38	-0.87	8.00
0.30-0.33	-10.51	96.01
0.29-0.33	-8.40	88.43
0.28-0.29	-4.93	71.53
0.25-0.26	-3.76	48.54

Table VI

RESULTS GROUPED BY ED

Case No.	Age	Sph. equiv.	ED	EC	Correction	% Corr.
12*	12.00	-8.25	0.38		-0.89	8.00
9	25.00	-8.62	0.33	0.21	-11.12	131.25
7	38.00	-12.67	0.32	0.10	-12.92	102.27
8	38.00	-15.50	0.32	0.10	-16.75	109.62
21	23.00	-10.75	0.30	0.12	-2.63	18.88
4	6.00	-6.37	0.30		-7.12	110.71
10	25.00	-13.25	0.30	0.12	-11.50	84.76
1	36.00	-9.75	0.30	0.10	-11.50	114.56
18	17.00	-15.75	0.29	0.10	-1.50	16.18
19	14.00	-4.50	0.29		-5 00	111.11
23	20.00	-4.75	0.29	0.09	-4.00	85.00
13	6.00	-12.75	0.28	0.09	-7.63	63.00
6	42.00	-8.00	0.28	0.15	-6.50	82.35
14	9.00	-6.00	0.27	0.13	-0.25	23.33
17	37.00	-18.37	0.27	0.10	-17.75	95.87
20	20.00	-6.75	0.26		0.50	-15.81
5	12.00	-7.25	0.26	0.15	-5.75	81.25
22	23.00	-13.00	0.25	0.11	-1.63	4.21
2	36.00	-9.25	0.25	0.11	-8.00	87.14
3	8.00	-5.75	0.25	0.10	-3.75	65.22
16	6.00	-7.50	0.25	0.10	-3.75	65.91
11	17.00	-5.50	0.25	0.15	-6.00	109.52
15	16.00	-13.67	0.25	0.11	-1.67	-9.09
AVERAGE	21.55	-9.80	0.28	0.12	-6.40	67.18
ED > 0.30	27.29	-10.99	0.31	0.12	-10.51	96.01
ED < 0.30	18.87	-9.25	0.27	0.11	-4.85	57.68

*Excluded

Two operative complications occurred in the series of this study. One was damage to the lenticule during the optical cut. The damaged lenticule was replaced with a homoplastic lenticule, in the same procedure, with satisfactory results (Case No. 11). The other ocurred during the section of the disc with the microkeratome, and left the disc slightly pyriform, but had no consequences (Case No. 14).

The postoperative complications were 1 case of peripheral epithelialization of the interface, solved by simple evacuation, 1 case with a visible peripheral scar and 4 cases which showed a slight Hudson - Sthally line under the pupillary center in the late postoperative period. Two cases with postoperative ametropias higher than the preoperative figures maintained their visual acuity.

In all cases, the refraction and visual acuity was determined by some one other than the surgeon.

Case No.	Complication	Evolution
4	Eptihelialization	Solved
11	Homoplastic KM	Satisfactory
12	Peripheral Scar	Persisted
14	Pyriform resection	Satisfactory
5,18,21 and 22	Hudson-Sthally	Persisted
12	Ectasia by Ed= 0.38	Persisted

CONCLUSIONS

This study shows that the results provided by keratomileusis for the correction of myopia are stable enough to make it indicated in cases of intolerance to high conventional correction and patients with relative amblyopia. It also shows that the surgical results should be considered 1 year postoperatively because, after that, the progression of the myopia depends especially on the axial growth of the globe. Moreover, the study shows that there is an average improvement in acuity, both in amblyopes as in cases with good initial vision.

Table VII shows a summary of the preoperative and postoperative parameters of this series, as well as the extreme values of each one and their standard deviation.

Table VII.

GENERAL SUMMARY - 23 CASES

	Average	Extreme values		Standard dev.
PREOPERATIVE				
Ametropia	-9.74	-4.50 to	-18.37	3.928
Astigmatism	-1.95	-5.25 to	-0.50	1.215
C/VA	0.41	0.10 to	1.00	0.297
Age	21.13	6.00 to	42.00	
Axial length	25.94	22.00 to	27.30	1.994
Initial radius	7.62	7.05 to	8.33	0.303
Correction requested	-9.60	-17.00 to	-5.00	3.354
Final radius request.	9.74	11.93 to	8.30	0.945
POSTOPERATIVE (1 MONTH)				
Final radius 1 month	9.31	11.00 to	8.22	0.760
U/VA 1 month	0.25	1.00 to	0.01	0.215
C/VA 1 month	0.43	1.00 to	0.05	0.234
Spherical equivalent	-0.06	-7.37 to	+5.75	2.654
POSTOPERATIVE (1 YEAR)				
Final radius 1 year	8.96	10.25 to	8.00	0.621
U/VA 1 year	0.24	0.80 to	0.04	0.198
Spherical equivalent	-1.49	-7.00 to	+2.50	2.765
C/VA 1 year	0.60	1.00 to	0.10	0.240
LATE POSTOPERATIVE				
Years of followup	9.29	20.75 to	2.25	5.332
Final radius	8.85	10.38 to	7.95	0.764
U/VA	0.27	0.67 to	0.02	0.256
C/VA	0.63	1.00 to	0.10	0.240
Spherical equivalent	-3.34	-12.00 to	+2.50	4.728
Axial length	26.89	31.58 to	23.00	2.129
Postop. astigmatism	-1.99	-4.25 to	-0.50	1.017
Correction obtained	-6.40	-17.75 to	+0.50	5.125
Improvement in VA	0.22	0.67 to	-0.20	0.265
Axial growth	1.40	4.55 to	-0.62	1.381
Change in RF	-0.06	-0.60 to	+0.47	0.314

REFERENCES

1. BARRAQUER, J. I.: *Queratomileusis y Queratofaquia.* Litografía Arco, Bogotá, 1980.

2. BARRAQUER, J. I.: *Keratomileusis for the correction of myopia.* Arch. Soc. Amer. Oftal. Optom. 16:221, 1982.

3. BARRAQUER, J. I., Tucker, David N.: *Refractive keratoplasty - clinical results in sixty seven cases. Ann. Ophthalmol. 5: 335, 1973.*

4. *SWINGER, C., BARRAQUER, J. I.: Keratophakia and keratomileusis - clinical results.* Ophthalmology, 88:8, 1981.