

ACTAS DEL SECUNDUM FORUM OPHTHALMOLOGICUM

RESULTS AND COMPLICATIONS
IN REFRACTIVE SURGERY

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Stimulated by the original work of Barraquer, it has now been shown without doubt that the corneal curve can be changed by the freeze-carve techniques of keratomileusis and keratophakia.

This paper is the analysis of results and complications from 54 cases of keratomileusis and 33 cases of keratophakia done between 1968 and 1974. An attempt is made to analyse the indications of these techniques in the present day world of improving soft contact lenses and intraocular lenses.

Keratomileusis

This was the first technique we investigated in 1968, both experimentally in donor eyes, then on clinical cases of unilateral high myopia with amblyopia. After the first few cases, it became apparent that in cases of dense amblyopia, the visual results were very disappointing, although the surgical results were excellent and the anisometropia successfully corrected. Cases without binocular function also did not benefit as much visually after a successful technical operation. When these cases were removed from the tables the remaining cases with binocular function are presented in Table 1.

As a result of this work, we feel that keratomileusis is most successful in cases with 6/60 - 6/12 vision (corrected) in the anisometropic amblyopic eye, and when there is some evidence of binocular function.

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TABLE I
 CASES OF KERATOMILEUSIS WITHOUT BINOCULAR FUNCTION

	Age	Pre-Op V. A.	Refraction	B. V.	Post-Op V. A.	Last Refract.	Post-Op Occlusion
1	27	6/12	-7.0/-2.5	✓	6/9	-2.5	-
2	50	6/24	-9.0	✓	6/12	-7.0	-
3	30	6/24	-7.0/-4.5	✓	6/12	-1.5	-
4	18	6/18	-6.0/-1.0	✓	6/12	-0.75/-1.25	-
5	10	2/60	-15.0/-2.0	✓	2/60	Axial Myopia	&Fuchs spots
●	22	6/12	-8.0/-3.0	✓	6/9	-1.75/-0.5	-
7	9	3/60	-13.5/-0.5	1st. Grade	6/36	-2.0	-
8	7	6/36	-5.0/-2.75	✓	6/18	0	disc ex- truded
9	7	6/36	-8.0/-3.0	✓	6/24	0	-
10	11	6/12	-10.0/-1.0	✓	6/12	-10.0/-0.75	-
11	33	6/12	-6.25/-2.0	✓	6/12	-1.0/-1.25	-
12	13	6/60	-9.25/-1.5	2 Grades	6/18	-2.0/-0.25	✓
13	7	6/24	-8.0/-1.0	✓	6/9	0	✓
14	6	5/60	-8.0/-1.0	✓	6/24	-1.0	✓
15	7	CF	-10.5	✓	6/36	-3.0/-0.75	✓
●	14	6/60	-8.0/-4.0	✓	6/12	0	✓
17	9	6/60	-8.0/-2.5	✓	6/9	0	✓
18	8	6/60	-6.5/-0.5	✓	6/24	0	✓
19	7	6/24	-4.5/-2.5	✓	6/24	0	✓
20	5	5/60	-11.0/-2.0	✓	6/24	0	✓
21	11	6/24	-8.0/-2.0	✓	6/24	-2.75/-1.0	✓
22	6	6/18	-8.0/-2.5	✓	6/18	-4.25	✓
23	6	6/24	-6.5/-2.5	✓	6/18	+2.5/-3.0	✓
24	20	6/24	-5.0/-2.5	✓	6/12	-2.0/-2.0	✓
25	6	6/18	-10.0/-2.0	✓	6/9	-1.0/-1.0	✓
26	6	6/18	-8.0/-0.5	2 Grades RCS	6/24	-1.5/-3.5	✓
27	6	6/12	-11.5	2 GradesRDS	6/18	-0.5/-4.0	✓

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Close co-operation with our Orthoptists was an important part of the pre and post-operative care of the patient. Some cases sent to us for possible surgery improved their visual acuity to 6/6 with glasses and occlusion and if this vision was maintained without occlusion, surgery was not done. It was also possible to exclude cases with eccentric fixation and those that did not improve to 6/60 after occlusion.

Constant orthoptic supervision is an important part of the treatment of the amblyopic if the best visual results are to be obtained.

Two cases of bilateral high myopia were operated on with success, the improvement in unaided vision being most appreciated by the patients; however, in these cases one is committed to surgery on the second eye.

We have noticed a very high incidence of children of West Indian origin with unilateral myopia. This was not explained and no statistics are available in the literature to this effect.

TABLE II
IMPROVEMENT OF VISION FOLLOWING KERATOMILEUSIS
WITH OR WITHOUT BINOCULAR FUNCTION

<i>1. Cases with some Binocular Function: 29 Cases</i>		
68% (20 cases)	Improved V.A.	Average increase 2.16 lines Snellen Greatest increase 5 lines.
6.0% (2 cases)	Worse V.A.	1 line
<i>2. Cases without Binocular Function: 25 Cases</i>		
20%	Improved V.A.	1 line only
8%	Worse V.A.	1 line only

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metry readings did not alter, although the eye became more myopic. One young boy developed a Fuchs spot in the macula.

TABLE III
 CASES OF KERATOPHAKIA. UNICULAR CATARACTS WITH
 BINOCULAR FUNCTION FOLLOWING INJURY

	1) Injuries			
	Pre. op.		post. op	
age	VA	refraction	VA	refraction
9	6/60	+12.0	6/36	-2.5
7	6/12	$\frac{+9.0}{+1.0}$	6/18	$\frac{-2.75}{-0.5}$
9	6/36	+12.0	6/18	0
11	6/36	+11.0	6/24	-1.5
19	6/6	$\frac{+12.5}{+0.75}$	6/9	$\frac{+1.0}{+1.25}$
6	6/36	+12.0	6/9	$\frac{+1.0}{+1.25}$
21	6/9	$\frac{+10.0}{+2.0}$	6/12	$\frac{+3.0}{-4.0}$

TABLE IV
 CASES OF KERATOPHAKIA. UNICULAR CATARACTS WITH
 BINOCULAR FUNCTION WITH NO HISTORY OF INJURY

		pre-op.	post-op.	
age	VA	refraction	VA	refraction
44	6/9	$\frac{+11.0}{+1.5}$	6/12	$\frac{+0.75}{+1.25}$
5	6/60	$\frac{+10.5}{+1.75}$	6/9	$\frac{+3.75}{+1.0}$
49	6/9	$\frac{+13.0}{+1.5}$	6/9	$\frac{+2.5}{+2.0}$
33	6/6	$\frac{+10.0}{+1.5}$	6/9	$\frac{+1.0}{-3.0}$

If the kerotectomy was too deep and close to Descemet's Membrane, some ectasia and loss of correction may occur. This may well happen in cases with a very thin central cornea.

Because of the possible increase in axial myopia, we usually keep patients under observation for at least 6 months to see if there is any increase in myopia. However, cases of marked unilateral myopia usually progress very little.

The first patient operated on in 1968 attended in 1975 with exactly the same refraction as he had immediately after surgery, and there is no doubt that some patients keep their new corneal curve.

Even when there was some progressive loss in correction, any visual improvement attained was maintained and no case returned to its original refraction.

3. *Amorphous opacities.* These have been shown by Barraquer to be epithelial and are usually small, peripheral and not large enough to affect the visual result. When necessary they are easily evacuated surgically. Only one case had a very large opacity.

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TABLE V

KERATOPHAKIA CASES WITH UNILATERAL
HYPERMETROPIC AMBLYOPIA

	age	pre. op.			post. op	
		VA	refr.		VA	refr.
1	7	6/60	$\frac{+5.5}{+1.0}$	LCS	6/36	$\frac{-1.0}{-2.25}$
2	22	6/18	$\frac{+4.0}{+2.0}$		6/9	$\frac{-1.0}{-1.0}$
3	8	3/60	$\frac{+5.0}{-1.0}$		6/36	$\frac{-2.0}{-2.0}$
4	8	6/24 -1	$\frac{+6.5}{+2.0}$		6/24	+2 0
5	16	6/36	$\frac{+4.0}{+1.5}$		6/36	0
6	7	6/18	$\frac{+6.0}{+1.5}$		6/18	$\frac{-0.5}{-1.5}$
7	9	6/24	$\frac{+7.5}{+0.25}$		6/24	$\frac{-3.5}{-2.0}$

4. *Under correction.* The earlier cases were all under-corrected. We found this due to not allowing for alternatives in disc diameter due to freezing, and was corrected in later cases. Care must be taken in suturing frozen tissue and this should not be handled by forceps as it is very friable.

Keratophakia

These cases had fewer complications. The amorphous opacities were fewer and smaller. There was very little change in the refraction obtained after surgery. The interface opacities usually cleared after about two months. One child operated on for hypermetropic amblyopia developed a posterior subcapsular cataract after prolonged use of Maxitrol drops. These are now only used for a very short time, especially in children with developing lenses.

No cases of infection or rejection occurred in either series.

TABLE VI
COMPLICATIONS FOLLOWING KERATOMILEUSIS

<i>COMPLICATIONS</i>	54 Cases Keratomileusis.
22% (12 cases)	Loss of correction after surgery.
20% (11 cases)	Amorphous opacities. 2 needed evacuation.
5% (3 cases)	Extrusion of disc.

TABLE VII
COMPLICATIONS FOLLOWING KERATOPHAKIA

<i>COMPLICATIONS</i>	Keratophakia. 31 cases.
Amorphous opacities. 5 cases.	amorphous opacities.
1 Case	persistant punctate keratitis cleared after 8/12

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SUMMARY

In this paper we have tried to critically evaluate the place of keratomileusis and keratophakia.

In our experience using Barraquer's techniques we feel that certain indications and contra-indications for this procedure are emerging. Cases for keratomileusis are much more successful where binocular function exists, and when the acuity can be improved to 6/60 to 6/12 pre-operatively. Keratophakia is successful in unilateral traumatic cataracts and in unilateral congenital cataracts appearing after the age of 3 (without microphthalmia). It may have a part to play in bilateral congenital cataracts, and it has a limited use in patients with hypermetropic amblyopia and binocular function.

REFERENCES

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