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Residual astigmatism

Delano M. Brown
Pacific University

Douglas K. Nehs
Pacific University

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Abstract

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Subject Categories

Optometry

Residual astigmatism

A Thesis
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By: Delano M. Brown
and
Douglas K. Nehs

Faculty Advisor: Dr. Charles B. Margach

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We should like to express our profound gratitude for the help and advise of Dr. Charles Margach in the compiling of our thesis. Also, we should like to thank those clinicians who gave of their time in the gathering of data which we needed on their patients.

INTRODUCTION

. It is our intent to show the gross cylindrical changes following the wearing of contact lenses. we want to show the residual astigmatism with contacts in place, the change in manifest cylinder before contacts compared to that upon removal of contacts, and also the change in corneal astigmatism determined by "K" readings taken before and after the wearing of contacts.

PROCEDURE

The patients used for this thesis were contact lens patients at Pacific University Optometric Clinic.

Each patient was fitted throughout his adaptation period by his original clinician. The clinician was responsible for gathering all the desired information on his own patient. In this manner we hoped to maintain consistency in technique on each individual patient.

The criteria utilized in selecting patients was that they had to have a minimum eight hours comfortable wearing time.

Fifty-eight patients were admitted to the contact

lens clinic during the time which our thesis material was gathered. Of these fifty-eight subjects, a sampling of 31% was utilized in the work up of the data. The remaining 69% were not used either because the desired information was not obtained on them or else they had not obtained the minimum of eight hours comfortable wearing time. In what follows we assume we have a random sampling.

An analytical examination was run, contact lenses were prescribed and on each of the following consultations three tests were taken; #7A with contacts, "K" upon removal of contacts, and #7A without contacts. An acuity check was also taken. The J.C.C. technique was utilized in all cases.

The equipment used was as follows; phoropter, projector with 20' acuity material, ophthalmometer or keratometer.

REVIEW OF THE LITERATURE

From the scanty literature available(see bibliography) we find the following propositions.

I. Rarely does residual astigmatism amount to more than 1.25 diopters.[1] Theoretically, contact lenses eliminate all corneal astigmatism. This assumption is consistent with the clinical observations that contact lenses aid such conditions as irregular corneas."[2] If there should be astigmatism in the crystalline lens, the contact lens would presumably not correct the condition.

II. It has been reported that there is very little lenticular astigmatism and that rarely does one find any great amount of true lenticular astigmatism in the fitting of contact lenses. Perhaps, Javal's theory that the crystalline lens had against the-rule-astigmia to compensate for the with-the-rule astigmia of the cornea is not as useful as thought. However, in contrast there is a leading contact lens company which computes all of astigmia by the use of Javal's rule.[3]

III. It has been reported that in many cases the .25, .75, or 1.00 D residual cylinder was induced by the contact lens on the tear layer.[4]

IV. If the ophthalmometer reading shows a cylinder and the cylinder is greater or less than in the manifest refraction, suspect lenticular.

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[1]T. E. Obrig, Contact Lenses. (New York, 1947), p.46

[2]"Gems of Knowledge," Vol. 59 No 121

[3]Kontur Kontact Lens Co., Inc.,

[4]"Gems of Knowledge," Vol. 59 No 121

PRESENTATION OF THE DATA

Table I

7A Residual Cylinder After Adaptation with Contact Lenses On

1. -0.50 x 65
   -0.50 x 11.5

2. no cylinder
   no cylinder

3. no cylinder
   no cylinder

4. -0.50 x 90
   -0.50 x 85

5. -0.25 x 120
   no cylinder

6. -0.50 x 80
   -1.00 x 120

7. no cylinder
   no cylinder

8. no cylinder
   no cylinder

9. -0.62 or 0.75 x 90
   -0.25 x 90

10. no cylinder
    no cylinder

11. no cylinder
    no cylinder

12. no cylinder
    no cylinder

13. no cylinder
    no cylinder

14. no cylinder
    no cylinder

15. -1.25 x 90
    -1.25 x 90

16. -0.25 x 90
    -0.25 x 90

17. -0.25 x 90
    -0.75 x 90

18. -0.50 x 90
    -0.25 x 90

Four cases shown below were excluded as the axis did not fall within 10° of 90 or 180. These cases did however fall closer to 90° than 180.

-0.25 x 65
-0.50 x 115
-0.25 x 120
-1.00 x 120

Graph I

7 A Residual Cylinder After Adaptation With Contact Lenses On

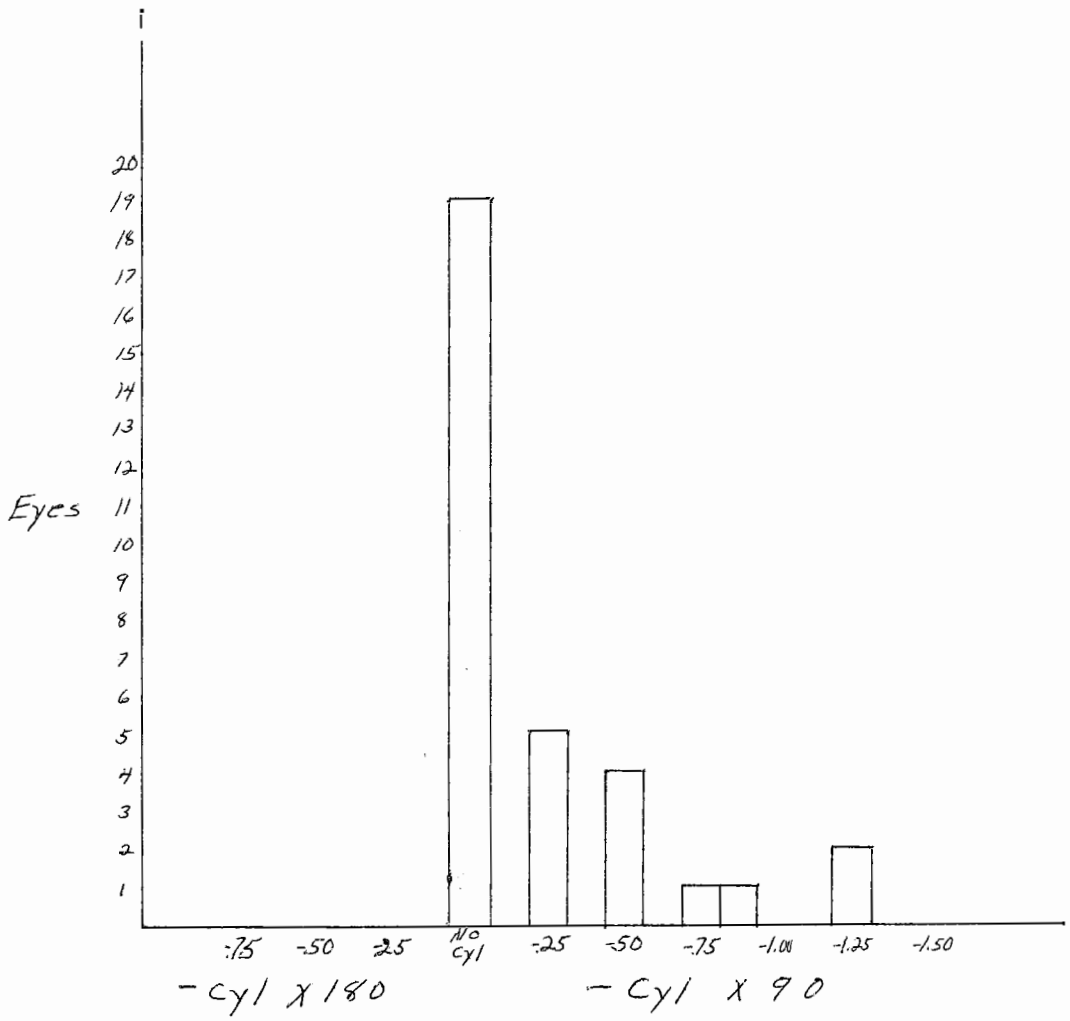


Table II

7 A Cylinder Before Contacts Versus 7A With Contacts Or After Eight Hours Wearing Time Established

Cylinder Before	Cylinder with Contact Lenses	Greater Cylinder	Less Cylinder
no cyl.	-0.50	-0.50	
no cyl.	-0.50	-0.50	
-1.50	no cyl.		-1.50
-2.00	no cyl.		-2.00
-0.50	no cyl.		-0.50
-0.25	no cyl.		-0.25
-0.75	-0.50		-0.25
-0.50	-0.50		no change
-0.50	-0.25		-0.25
-0.75	no cyl.		-0.75
-1.25	-0.50		-0.75
-1.00	-1.00		no change
no cyl.	no cyl.		no change
no cyl.	no cyl.		no change
-0.75	no cyl.		-0.75
-0.75	no cyl.		-0.75
-0.50	-0.75	-0.25	
-0.25	-0.25		no change
-0.75	no cyl.		-0.75
-0.25	no cyl.		-0.25
-1.00	no cyl.		-1.00
no cyl.	no cyl.		no change
-0.50	no cyl.		-0.50
-1.00	no cyl.		-1.00
-0.75	no cyl.		-0.75
-0.75	no cyl.		-0.75
-0.25	no cyl.		-0.25
-0.75	-1.25	-0.50	
no cyl.	-1.25	-1.25	
no cyl.	-1.25	-1.25	
-0.25	-0.25		no change
-0.50	-0.25		-0.25
-0.25	-0.25		no change
-0.25	-0.75	-0.50	
no cyl.	-0.75	-0.75	
-0.25	-0.25		no change

Graph II

7A Cylinder Before Contacts Versus 7A With Contacts Or After Eight Hours Wearing Time Established

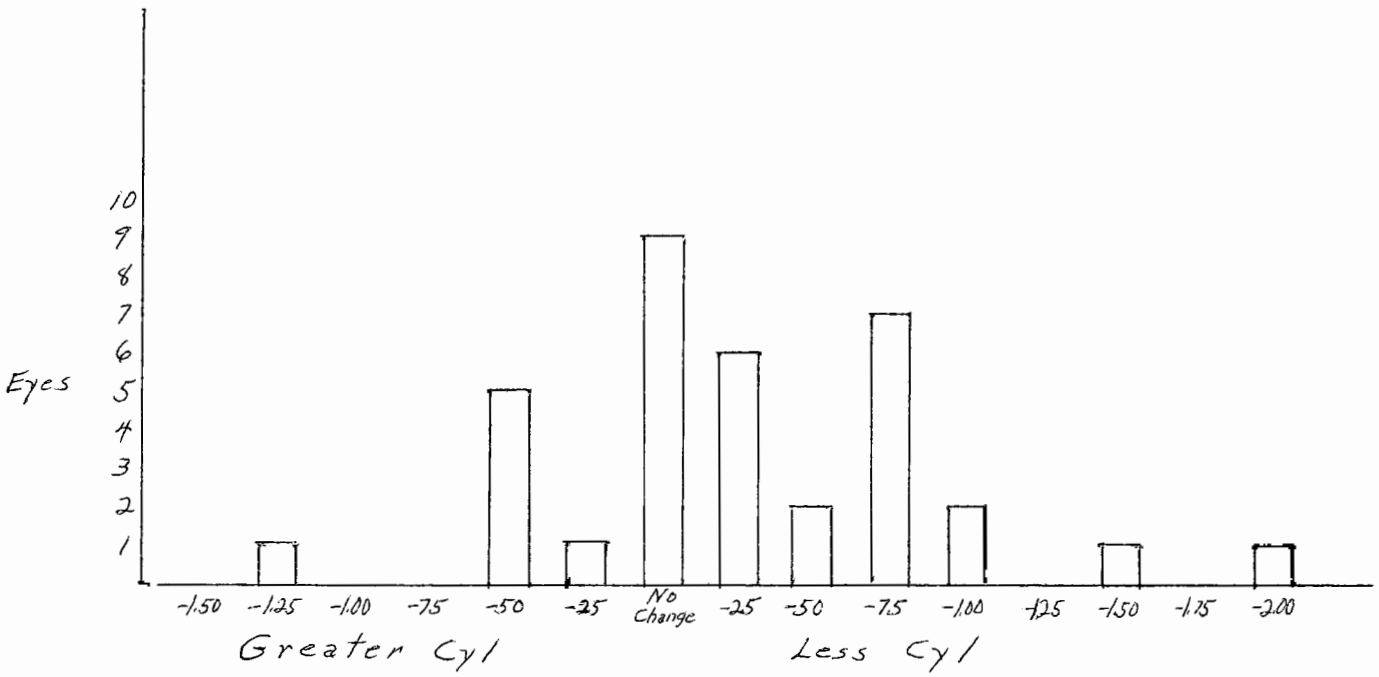


Table III

7A Before Contact Lenses Versus 7A Without Contact Lenses After Adaptation (Eight Hours)

Before	After	Greater Cylinder	Less Cylinder
-2.75	-2.25 -0.50 x 45	-0.50	
-1.75	-1.25 -0.50 x 135	-0.50	
-1.00 -1.50 x 180	-1.00 -0.75 x 20		-0.75
-0.50 -2.00 x 175	-0.50 -0.75 x 165		-1.25
-4.00 -0.50 x 75	-4.75 -1.00 x 75	-0.50	
-4.25 -0.25 x 180	-4.75 -0.25 x 180	no change	
-4.50 -0.75 x 15	-4.75		-0.75
-4.50 -0.50 x 150	-4.75 -0.25 x 120		-0.25
-4.00 -0.50 x 100	-5.50 -0.25 x 150		-0.25
-0.75 -0.75 x 62	-3.00		-0.75
-2.75 -1.25 x 95	-5.00 -1.00 x 75		-0.25
-3.75 -1.00 x 90	-5.00 -1.25 x 90	-0.25	
-0.75 -0.75 x 177	≠1.25 -0.75 x 180	no change	
-0.75 -0.75 x 180	≠1.25 -0.75 x 90	no change	
-4.25 -0.75 x 107	-4.25 -0.75 x 107	no change	
-4.00 -0.25 x 130	-4.25 -0.25 x 130	no change	
-4.75 -1.00 x 82	Blur	These three cases were ex-	
-4.75		cluded, two because of spec-	
-4.50 -0.50 x 05	Blur	tacle blur and one from mono-	
-3.50 -1.00 x 178		cular diplopia upon removal	
≠0.50 -0.75 x 10	Blur	of contacts	
≠0.50 -0.75 x 170			
-6.00 -0.25 x 140	-5.75 -1.00 x 75	-0.75	
-2.25 -0.75 x 20	-1.50 -1.00 x 85	-0.25	
-2.75	-3.50 -0.75 x 10	-0.75	
-2.75	-3.50 -1.25 x 155	-1.25	
-3.50 -0.25 x 80	-3.50 -0.25 x 80	no change	
-3.25 -0.50 x 70	-3.25 -0.25 x 80		-0.25
-3.50 -0.25 x 10	-3.75 -0.75 x 80	-0.50	
-2.25 -0.25 x 125	-2.50 -0.75 x 125	-0.50	
-1.50	≠0.27 -0.75 x 100	-0.75	
-1.25 -0.25 x 120	pl. -0.25 x 60	no change	

Graph III

7A Before Contact Lenses Versus 7A Without Contact Lenses After Adaptation (Eight Hours)

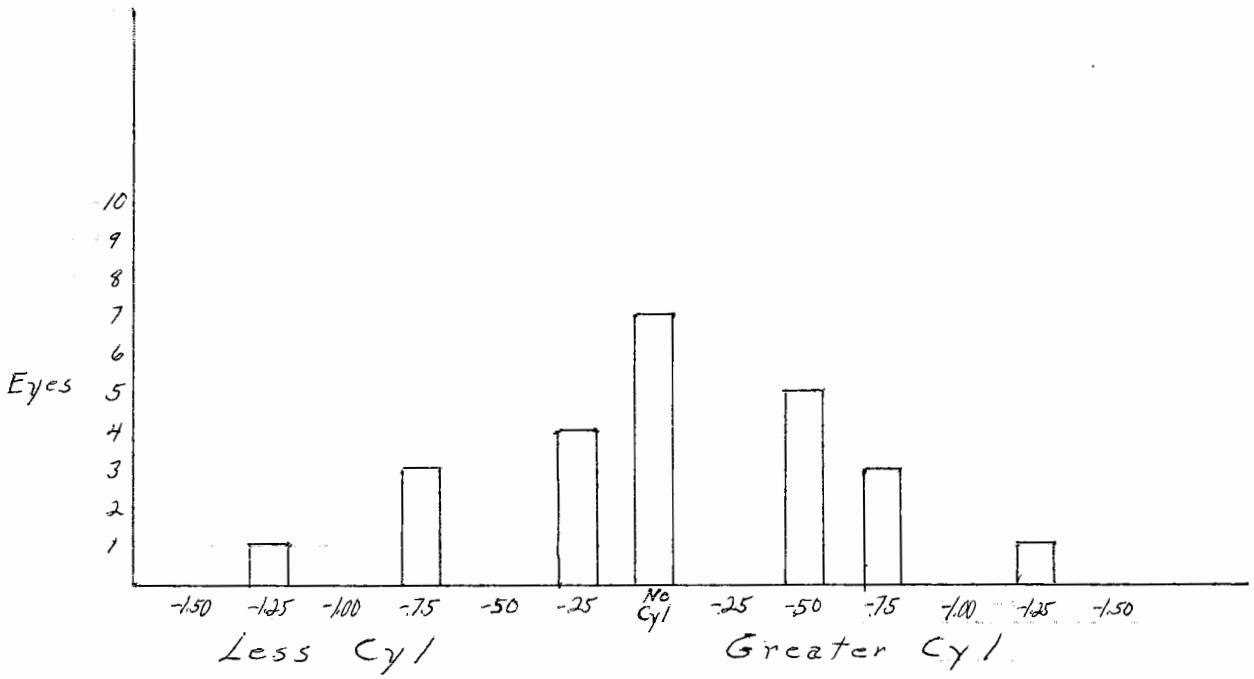


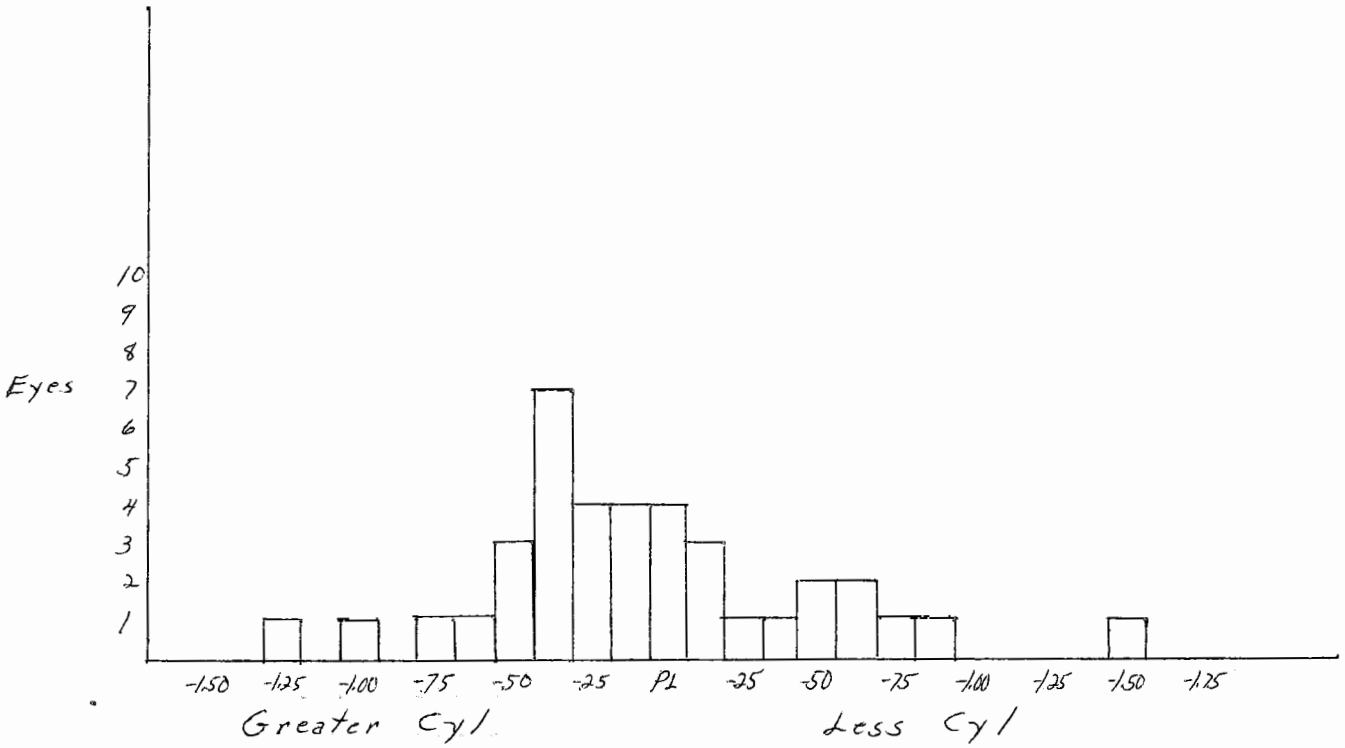
Table IV

Change In Gross "K" Readings After Adaptation

Greater Cylinder	Less Cylinder	No Change
.62	.75	pl.
.50	.87	pl.
.12	.62	pl.
.37	.62	pl.
.75	.50	
.37	.12	
.37	.50	
.37	1.50	
.50	.25	
.25	.37	
.50	.12	
1.25	.12	
.12		
.37		
.12		
.37		
.12		
.37		
.37		
.25		
.12		
1.00		

Graph IV

Change In Gross "K" Reading After Adaptation



From Table I

7A Residual Cylinder After Adaptation with Contact Lenses On

0 eyes show residual cylinder x 180
19 eyes show no residual cylinder
13 eyes show residual cylinder x 90

Amounts
5 eyes show -0.25 x 90
4 eyes show -0.50 x 90
1 eye shows -0.75 x 90
1 eye shows -0.87 x 90
2 eyes show -1.25 x 90

From Table II

7A Cylinder Before Contacts Versus 7A With Contacts Or After Eight Hours Wearing Time Established

7 eyes show less cylinder
9 eyes show no change
19 eyes show greater cylinder

From Table III

7A Before Contact Lenses Versus 7A without Contact Lenses After Adaptation (Eight Hours)

8 eyes show less cylinder
7 eyes show no change
11 eyes show greater cylinder

From Table IV

Change In Gross "K" Readings After Adaptation

4 eyes show no change
20 eyes show greater cylinder
12 eyes show less cylinder

ATTEMPT TO GENERALIZE

We have shown from our data that there is a variation in the "K" readings following the wearing of contact lenses. However, we do not know if this is a permanent or temporary change. This information will be presented in a thesis by Drs. Haraldson and Moravec.

Discussion

For the benefit of anyone desiring to do further study in this area it is recommended that the clinicians doing the study should themselves run the tests needed. This should obtain more consistency of the data gathering. Also, the battery of tests used should be run only twice instead of at every consultation. Therefore, they would be run on the initial examination and using the criterian stated previously in regards to wearing time. This would mean that a greater number of subjects could be utilized due to the reduction in amount of testing having to be done on each subject and thus reducing the time load on the individuals doing the study.

SUMMARY

A study has been made of a group of patients in an attempt to gather information regarding residual astigmatism. In the analysis, the amount and type (with or against the rule) of residual astigmatism are shown. We also show the trend in the gross change of the corneal astigmatic condition as well as the manifest cylinder change upon removal of contacts.

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