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Laura F. Patterson
Pacific University

Stephanie Sipe
Pacific University

Sureen Bachra
Pacific University

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Abstract

To improve the efficiency of fitting toric soft contact lenses Cooper Vision designed Tori Track, software that calculates the final prescription using any trial lens of known power and SCOR without the estimation of rotation. The clinical success of traditional empirical fitting versus using a randomly selected diagnostic lens with Tori Track was compared using 28 eyes with at least 1.50D of cylinder. The initial visit included empirically fitting the subjects with Frequency 55 toric lenses by vertex correcting their manifest refraction. Following equilibration and an acceptable fit, acuities were taken using Snellen and high and low contrast Bailey Lovie charts. On a second visit, a -3.00-1.25 x040 lens was fit on all the patients and a SCOR was performed. ToriTrack was then used to predict the final lens parametres. The results of the initial visit were compared to the second visit. We found that on average ToriTrack predicted the final lens to undercorrect by 0.33D (spherical equivalent) more than the initial visit. Cylinder power was consistant between both parts, but the axis showed a shift of 15 degrees in 14 out of the 28 eyes. Even with the large axis shift, acuities were not significantly affected. Using ToriTrack and a diagnostic lens did not appear to be significantly more efficient than emprically fitting the lens. However, ToriTrack was useful for the built in vertex calculator, comprehensive catalogue of CooperVision lenses and maintaining patient records.

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

Patrick J. Caroline

Keywords

toritrack, coopervision, frequency 55 toric lenses, vertex corrected, empirical fitting

Subject Categories

Optometry

THE CLINICAL SUCCESS OF EMPIRICALLY FIT SOFT TORIC CONTACT LENSES VERSUS FITTING USING DIAGNOSTIC TRIAL LENSES AND TORITRACK

BY

LAURA F. PATTERSON

STEPHANIE SIPE

SUREEN BACHRA

A thesis submitted to the faculty of the
College of Optometry
Pacific University
Forest Grove, Oregon
for the degree of Doctor of Optometry
May 2005

Advisors:

Patrick J. Caroline, FAAO
Mark P. Andre, FAAO

LAURA F. PATTERSON

STEPHANIE SIPE

SUREEN BACHRA

PATRICK J. CAROLINE, FAAO

MARK P. ANDRE, FAAO

BIOGRAPHIES

LAURA F. PATTERSON

1996 – 2000: University of Georgia, Bachelor of Science, Major in Biochemistry and Molecular Bilogy

2001 – 2005: Pacific University College of Optometry, Class of 2005

Involvement: American Optometric Student Association, American Academy of Optometrists, A.M.I.G.O.S. (Participated in trips to Moldova and Ecuador).

Fellowship of Christian Optometrists (Community Service Coordinator), Beta Sigma Kappa International Optometric Honor Society, Optometric Extension Program.

Future plans: Practice Optometry in the State of Nevada

STEPHANIE SIPE

Stephanie Sipe has a bachelor's degree in Biology from Washington State University and will receive her doctorate of Optometry in May of 2005.

Stephanie has participated in Amigos EyeCare for three years, where she also served as historian for one year and as a trip leader to Mexico. She currently is the OEP national liaison and served as the local liaison during her third year of optometry school. She also is a member of COVD, OEP, OOPA, WAOP, BSK Optometric Honor Society and AOSA.

SUREEN BACHRA

Sureen Bachra graduated from the University of British Columbia (UBC) with a Bachelor of Science in Biology in 1997. She went on to pursue a Bachelor of Education from UBC graduating in 1999. She taught High School Science, Math and Punjabi before entering Pacific University College of Optometry. Following receipt of a Doctor of Optometry in May 2005 she will be joining a primary care practice in New Westminster British Columbia.

ABSTRACT

To improve the efficiency of fitting toric soft contact lenses CooperVision designed ToriTrack, software that calculates the final prescription using any trial lens of known power and SCOR without the estimation of rotation. The clinical success of traditional empirical fitting versus using a randomly selected diagnostic lens with ToriTrack was compared using 28 eyes with at least 1.50D of cylinder. The initial visit included empirically fitting the subjects with Frequency 55 toric lenses by vertex correcting their manifest refraction. Following equilibration and an acceptable fit, acuities were taken using Snellen and high and low contrast Bailey Lovie charts. On a second visit, a –3.00 –1.25 x040 lens was fit on all the patients and a SCOR was performed. ToriTrack was then used to predict the final lens parametres. The results of the initial visit were compared to the second visit. We found that on average ToriTrack predicted the final lens to undercorrect by 0.33D (spherical equivalent) more than the initial visit. Cylinder power was consistant between both parts, but the axis showed a shift of 15 degrees in 14 out of the 28 eyes. Even with the large axis shift, acuities were not significantly affected. Using ToriTrack and a diagnostic lens did not appear to be significantly more efficient than emprically fitting the lens. However, ToriTrack was useful for the built in vertex calculator, comprehensive catalogue of CooperVision lenses and maintaining patient records.

KEYWORDS: ToriTrack, CooperVision, Frequency 55 Toric Lenses, vertex corrected, empirical fitting.

ACKNOWLEDGMENTS

We would like to express our sincere gratitude to all who participated in our study. Thanks especially to Pat and Mark for their knowledge and guidance over the last two years. We would also like to recognize CooperVision, Inc. at this time for their generous donation of lenses and monetary compensation for our subjects.

INTRODUCTION:

In determining the correct soft toric contact lens prescription to prescribe for patients, practitioners have a variety of methods available. In the past, due to chronic lens variability, many practitioners simply began by fitting these lenses empirically, based on the manifest refraction vertexed to the plane of the cornea. Further adjustments were made until a lens providing both acceptable comfort and vision was found. With the advent of more standardized manufacturing techniques, practitioners began to realize the importance of taking lens rotation into consideration when coming up with the final lens power; for example, using the simplified LARS (left add right subtract) technique to adjust the over-refraction. The goal of this method was to achieve a successful fit with fewer office visits. However, this method is problematic in that it requires a high degree of accuracy in measuring the amount of rotation.

In response to this, several contact lens manufacturers have developed software programs, which calculate the final prescription using a trial lens of known power and the SCOR (sphero-cylinder over-refraction) results. It has been shown that using the patient's spectacle prescription along with the SCOR from a trial lens of known power can be used to infer the rotational position of the lens on the eye.[1] Cooper Vision's ToriTrack System uses this method to calculate the final lens power. The purpose of this technology is to simplify the fitting process by eliminating the need to estimate lens rotation. The ultimate goal is to allow practitioners to use the lenses they have on hand in the initial fit, and order the correct lens for the patient at the first visit, saving time and money for all involved.

Previous studies have shown that empirically fitting soft toric lenses can be successful the first time at a rate greater than 70%.[2] Coe achieved a success rate of 72% using Cooper Vision's Frequency 55 soft toric lenses.[3] However, the success and accuracy of using calculating software along with a diagnostic lens has not been determined. The purpose of this study is to determine whether the success rate of empirically fitting Cooper Vision's Frequency 55 soft toric lenses can be matched using a randomly selected diagnostic lens and ToriTrack's calculating software.

METHODS:

A total of 14 patients completed the study. Participants had a variety of previous lens wearing experience. The only eligibility criterion was that participants have at least 1.50D of astigmatism in their manifest refraction in one or both eyes. Only eyes meeting the eligibility criteria were included, yielding a total of 27 eyes considered in the study.

At the initial visit, each subject was refracted and visual acuity was measured through the manifest refraction with Snellen and high and low contrast Bailey Lovie charts. Keratometric values were measured manually with a keratometer and with the Zeiss Corneal Topographer. HVID was measured with a pd ruler.

In part one of the experiment, each subject was empirically fit with Coopervision Frequency 55 Toric lenses by vertexing the manifest refraction to the plane of the cornea. After a 20-minute equilibration time the lens fit was assessed with a slit lamp by examining movement with blink and with the push-up test, and lens centration. Distance acuities were taken through the contact lens with Snellen and high and low contrast Bailey Lovie charts.

In part two of the experiment, a randomly selected trial lens of -3.00 -1.25 x 040 was used for all patients. After a 20-minute equilibration period, a SCOR was performed as before. ToriTrack was used to predict final lens parameters based on the power of the trial lens and the

SCOR results. The final lens specifications recommended in part two were compared to those from part one.

RESULTS:

Only one out of 28 eyes failed to achieve 20/20 or better with the empirically fit lens; the average over-refraction was +0.10D spherical equivalent. When comparing the lens predicted using the randomly selected trial toric lens to the empirically fit lens, we found the following discrepancies: the average spherical equivalent over-refraction through the final predicted lens was 0.34D more minus than that of the empirically fit lens, with the largest difference being in the spherical component. The change in sphere and cylinder power can be observed in Table 1. Cylinder power was consistent between trials. Only four eyes showed more than 0.25D difference in cylinder power between the two fitting methods.

	Sphere Power		**Cylinder Power**	
Change in Power	***# of Eyes***	***% of Eyes***	***# Eyes***	***% of Eyes***
+1.25	2	4.2%	0	0.0%
+1.00	3	12.5%	1	3.6%
+0.75	4	12.5%	0	0.0%
+0.50	6	25%	0	0.0%
+0.25	6	20.8%	6	21.4%
0.00	3	8.3%	10	35.7%
-0.25	1	4.2%	5	17.9%
-0.50	1	4.2%	4	14.3%
-0.75	2	8.3%	2	7.1%

Table 1: Percent of eyes with a change in sphere and cylinder power

Cylinder axis showed more variability (see Table 2). A difference in axis of 15 degrees or more was noted in 14 of 28 lenses. Interestingly, these large shifts in axis did not correspond with a reduction in acuity.

Axis Shift	*# of Eyes*	*% of Eyes*
0-5	7	25%
6-10	5	17.9%
11-15	5	17.9%
16-20	7	25%
>20	4	14.2%

Table 2: Change in axis

Ten patients (18 eyes) were available to try the lens predicted using the diagnostic lens and the resultant over refraction. The changes in acuity achieved by both lenses are summarized in Table 3. Eleven eyes lost one line of acuity with the trial lens. Four of these 18 eyes lost 2 lines of acuity giving them less than 20/20 acuity.

	Empirically fit Lens		**TT and diagnostic lens**	
Acuity	*# of Eyes*	*% of Eyes*	*# of Eyes*	*% of Eyes*
20/10	3	10.7%	0	0
20/15	20	71.4%	5	27.7%
20/20	4	14.3%	9	50%
20/25	1	3.6%	4	22.3%

Table 3: Acuity achieved by empirically fit lens versus TT and a diagnostic lens

DISCUSSION:

The patients whose axis most closely matched the axis of our randomly selected diagnostic lens (x040) obtained the best outcome with ToriTrack's lens calculator. We predict that a more accurate lens recommendation would be achieved if the practitioner were to choose trial lenses of with-the-rule, against-the-rule, or oblique axes to more closely match the patient's own axis. Considering this, further exploration should be done using trial toric lenses of with the rule, against the rule, and oblique axes on each patient to confirm this trend.

The prescription calculated using the diagnostic lens, over-refraction, and lens calculator was consistently less minus than the empirically fit lens, even in patients whose axis matched that of the trial lens. The magnitude of under-correction was large enough to account for the reduction of acuity in most patients. The large shift in axis in some patients may also account for some reduction in acuity. However, it should be noted that several patients had acceptable acuities despite a substantial axis shift, and reduction of acuity had a greater correlation to the reduction of minus in the spherical power of the lens.

Overall, there was a slight reduction in acuity with the diagnostic predicted lens when compared to the empirically fit lens. Still, most patients achieved 20/20 vision or better with either fitting method. As all but one eye in our study achieved 20/20 vision or better with empirical fitting alone, we conclude that a practitioner can successfully fit most patients in this manner, without the need for additional LARS calculations, or trial lenses and lens calculating software. However, the ToriTrack software did prove to be very helpful because of the built in vertexing calculator and comprehensive catalog of Coopervision lenses available. The software also has a function that will predict the best line of lenses for each patient based on refraction, keratometric data, and HVID. While we did not employ this feature in our thesis, this would certainly be a benefit to clinicians who are not bound to use only one brand of lenses, as the structure of our thesis necessitated.

If the criterion for a successful fit is defined as 20/20 vision or better, there was only one patient in our population sample who was not successful with the empirically fit lens. For this patient the lens predicted with ToriTrack was a much better option. While we cannot draw firm conclusions from one case example, we suspect that using trial lenses and SCOR results with a lens predicting calculator would be of most benefit when working with similar patients who were not successful with the empirically fit lens.

In summary, empirical fitting of contact lenses will be successful with most patients, with out the need for trial lenses or additional calculations such as LARS. These strategies become of benefit for the rare patient who does not achieve acceptable vision through the empirically fit lens. However, we did find the new software programs to be useful tools for other reasons such as maintaining patient records and vertex calculations. The inconsistencies inherent in a small patient population make it impossible to conclusively prove the trends found in this study. Further study is needed to explore whether these trends apply for other types of contact lenses.

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