

COMPARISON OF PATIENT COMFORT FOR TORIC SILICONE HYDROGEL
LENSES.

by

Nathan Slezak and Carl Erickson

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ABSTRACT

Background: Many new toric silicone hydrogel contact lenses have recently entered the market to correct astigmatism in patients. With the multiple differences between different contact lens manufacturers, it is hard to determine which toric silicone hydrogel lens offers the best comfort and visual acuity. *Methods:* Patients are fit into *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism* lenses. Subjects are assessed for comfort, visual acuity, and contact lens fit. The comfort scale being used was derived from the staining grid study. The patients are given instructions to record their comfort of the lens at the end of the first day and at the end of the two-week wearing period. *Conclusion:* The data and results showed that there was no statistical significance in either initial or end comfort between *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism* lenses.

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Introduction:

Silicone hydrogel lenses has come a long way since their introduction 10 years ago. They started out as spherical lenses used to help reduce corneal hypoxia from traditional hydrogel lenses, as well as their ability to be worn overnight. Since then silicone hydrogel lenses have been utilized for toric and multifocal lenses.

The advantage of silicone hydrogels is their increased oxygen transmissibility (Dk/t) over conventional hydrogel lenses. This allows patients who require thicker lens profiles including high myopes, high hyperopes and astigmats to benefit from silicone hydrogel lenses and their higher Dk/t¹. Eghbali et al (1996) studied the amount of Dk/t on prism-ballasted toric soft contact lenses made of traditional materials. It was found that the inferior cornea, where the lens is thickest, receives one-half to one-third the amount of oxygen through toric soft lenses made in traditional materials¹. A more recent study by Forister et al (2008) studied the differences in Dk/t between toric hydrogels and silicone toric hydrogels. The results showed that silicone hydrogel toric soft lenses would provide more reasonable anterior corneal oxygenation over traditional hydrogel lens materials, especially during daily wear².

Although there has been improvements in oxygen transmissibility (Dk/t), there have been patient concerns with comfort surrounding silicone hydrogel lenses³. It has been shown that silicone hydrogel toric lenses are more oxygen permeable than traditional hydrogel lenses. In our study we will determine between two brands, *Acuvue Oasis for Astigmatism* and *Ciba's Air Optix for Astigmatism* which has better patient comfort. We find this study to be important because it can help clinicians provide better

contact lens comfort to their patients and help them switch more of their astigmatic patients into silicone hydrogel torics lenses.

Methods:

The subjects were provided Informed consent, approved by Ferris State University, and volunteered to wear the contact lenses provided according to the study requirements.

The inclusion criteria for the study were as follows:

1. 20-35 years old male or female
2. Astigmatism ≥ -0.75 DC and ≤ -2.50 DC
3. Best spectacle-corrected visual acuity of 20/20 or better

The exclusion Criteria for the study were as follows:

1. Astigmatism < -0.75 DC and > -2.50
2. History of contact lens non-compliance
3. Current rigid contact lens wear
4. Ocular disease contraindicated for contact lens wear

This study was conducted from April 1st 2009 until April 30th 2009 and included 11 volunteers – three males and eight females. All eleven subjects had myopic astigmatism > -0.75 DC. The best spectacle-corrected visual acuity was 20/20 or better in all subjects. No ocular disease was found during routine examination of the anterior segment on any of the 11 volunteers. None of the volunteers had any contraindications to contact lens wear.

Two different silicone hydrogel toric lens designs from different companies were used in this study. Both brands are frequent replacement lenses and have been used mostly as daily wear by practitioners. The first silicone hydrogel lens was *Acuvue Oasys*

for Astigmatism. The second silicone hydrogel lens was *Air Optix for Astigmatism*.

Every volunteer was randomized to first wear one of the lenses for eight hours a day each day for two weeks duration. After two weeks, the volunteers were switched to the opposite brand with the same wear schedule as described above.

At the end of two weeks each volunteer underwent best spectacle-corrected visual acuity, over refraction, and slit lamp examination of the anterior segment. At the end of each wear period, the volunteers were asked to fill out a survey rating comfort and vision in each lens.

After the first two-week test period, the volunteers completed the subjective comfort and vision form about the contact lens worn for that period. The same evaluation was again given at the completion at the end of the second two-week wear period of the second contact lens. The evaluation was scored on 0 – 100 scale. 0 = causes pain, 20 = very uncomfortable (very irritating or annoying), 40 = slightly uncomfortable (just irritating or annoying), 60 = comfortable (noticeable but not irritating), 80 = very comfortable (just felt occasionally), 100 = excellent (lens cannot be felt).

Results

The data for initial and final comfort of *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism* was collected using the grading scale used in the Staining Grid Study⁴. There were 12 total participants that were fit by two clinicians. The participants were all previous successful toric contact lens patients. The data was analyzed using a T-Test analysis to see if there was a statistical significance between the initial and final comfort between the two lenses. Non-compliance and contact lens intolerance was not an

issue for any of the participants during this study. All patients were able to obtain 20/20 acuity at both the initial fitting and final assessment of each lens type for each eye. Of the 11 subjects, 7 used *Clear Care*, 3 used *Opti-Free Replenish*, and 1 used *Renu Multi-purpose Solution*. Because of the low number of subjects, an accurate assessment of contact lens solution on comfort could not be made.

Air Optix for Astigmatism showed a slightly higher initial comfort, 75.00, and final comfort, 70.27, than the initial comfort, 68.18, and final comfort, 66.36, for the *Acuvue Oasys for Astigmatism* (table 1, graph 1). The T-test showed no statistical significance between the initial comfort between *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism*. It also showed no statistical significance between the final comfort between *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism*. The critical T-value for both the initial and final comfort was 2.27. The T-value for the initial comfort was 0.86, and the T-value for the final comfort was 0.52 (table 1). The T-value for both initial and final comfort was under the critical T-value of 2.27 showing that there is no statistical significance between the initial comfort of the two lenses as well as no statistical significance between the final comfort of the two lenses.

Table 1. Shows both the initial and end comfort for each of the contact lenses used. This table also includes the statistical analysis of the collected data.

Acuvue Oasys for Astigmatism					Air Optix for Astigmatism				
Patient	Initial Comfort	End Comfort	Solution	Hrs/Day	Patient	Initial Comfort	End Comfort	Solution	Hrs/Day
1	65	50	CC	16	1	60	43	CC	16
2	70	60	OF	8	2	85	85	OF	8
3	70	60	RN	14	3	80	75	RN	13
4	40	60	CC	5	4	100	80	CC	16
5	60	60	OF	5	5	40	60	OF	6
6	85	90	CC	14	6	60	60	CC	10
7	40	60	CC	7	7	80	80	CC	10
8	80	40	CC	10	8	100	90	CC	15
9	90	90	CC	15	9	50	80	CC	12
10	60	60	CC	18	10	80	40	CC	17
11	90	100	OF	14	11	90	80	OF	15
Mean	68.18	66.36		11.45		75.00	70.27		12.55
Variance	311.36	345.45		21.27	11.00	395.00	287.82		13.27
STD	17.65	18.59		4.61	3.32	19.87	16.97		3.64
	18.67	17.48		4.09					
Initial Comfort T-Value	0.86								
End Comfort T-Value	0.52								
Degrees of Freedom	20.00								
T	2.27								

Graph 1. Shows the average initial and final comfort for both contact lenses used in this study.

Discussion:

The successful fitting and continual wear of toric soft lenses has often been a difficult process for many practitioners. The dropout rate for soft toric lenses has been higher than spherical lenses due to fluctuating vision and comfort⁵. This study was aimed

to see if there was a significance difference between the initial and final comfort of two different toric silicone hydrogel lenses. The two lenses, *Acuvue Oasys for Astigmatism* and *Air Optix for Astigmatism*, showed no statistical significance in comfort even though the averages for the *Air Optix for Astigmatism* lens were slightly higher than *Acuvue Oasys for Astigmatism* (table 1). Successful vision (20/20) was obtained in all patients during the trial.

This study did not include any efforts to control which type of solution or the wearing schedule of the participants. Although each patient used the same solution for each lens, how the specific material of each lens reacts to different materials is not known. Such information could be factors of an individual's comfort while wearing a contact lens. A stricter wearing schedule where each lens was worn for the same amount of time a day could have proven useful in keeping the variables of this experiment to a minimum.

Through the fitting of both lenses, all patients were able to comfortably wear each lens throughout the day. Though the study showed no difference between the two lenses, there seemed to be a definitive favorite between most patients that was verbally relayed during fitting process. Clinically, it suggests that the overall comfort and long-term wearing success of toric hydrogel lenses may be an individual process rather than fitting the masses with the same lens.

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