Can Precision UV Mask Astigmatism?

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INTRODUCTION

The article "Do Disposable Contact Lenses Mask Astigmatism?" by Michael G. Harris O.D., J.D., M.S., and others was published in the May/June 1996 issue of Optical Prism. The article described a study in which the masking of astigmatism effect of three lenses were compared: CSI Clarity (conventional), Acuvue (disposable), and Surevue (disposable). They did not find any significant difference in the amount of astigmatism masked by these three lens types.[1] Now there is a new, thicker disposable contact lens, Precision UV, by Wesley Jessen that may perform better at masking refractive astigmatism.

It is thought that spherical lenses made thicker or of a stiffer polymer can neutralize of mask some corneal cylinder much in the same way that a rigid gas permeable lens does, by creating a tear lens. There have been clinical investigations in the past that have found no statistically significant masking of astigmatism with conventional spherical hydrogels.[1] However, there are many anecdotal reports that spherical soft lenses can, and do mask corneal astigmatism which leads to improved visual acuity.

Wesley Jessen has stated that the intended use of Precision UV is "for the correction of visual acuity in not-aphakic persons with non-diseased eyes that are myopic or hyperopic and may have 2.00 diopter (D) or less of corneal astigmatism that does not interfere with visual acuity."[3] Our study was designed to parallel the 1996 study by Dr. Harris to see if this new, thicker lens can mask astigmatism, even up to 2.00 D of corneal astigmatism.

MATERIALS

The contact lens evaluated in this study, Precision UV, is made of Vasurfilcon A (a copolymer of methyl Methacrylate, vinyl pyrrolidone, and other methacrylates with the addition of the proprietary UV absorbing monomer, UVAM) and is manufactured by Wesley Jessen. This lens can be used as a frequent replacement lens or as a disposable lens. Its characteristics are compared to CSI Clarity, Acuvue, and Surevue in Table 1.

TABLE 1: Lens Characteristics (from Tyler's Quarterly)

	CSI Clarity	Acuvue	Surevue	Precision UV
Manufacturer	WJ	Vistakon	Vistacon	WJ
Material	crofilcon A	etafilcon A	etafilcon A	vasurfilcon A
Design	lathe cut	soft molding	soft molding	cast-molded
DK	13	28	28	38.9
Water content	38.6%	58.0%	58.0%	74.0%
FDA Group	1	4	4	2
Base curve	8.0, 8.3, 8.6 mm	8.4, 8.8, 9.1, 9.3 mm	8.4,8.8, 9.1 mm	8.4, 8.7 mm
Diameter	13.8 mm	14.0 mm	14.0 mm	14.4 mm
Center thickness	0.06 mm (-3.00)	0.07 mm (-3.00)	0.105 mm (-3.00)	0.07to0.19 mm
Power	+8.00 to -20.00D	+6.00 to -11.00	+6.00 to -9.00	+8.00 to -10.00D
Wear schedule	DW	DW or EW	DW	DW or EW

SUBJECTS

Seven subjects contributing a total of 13 eyes participated in this study. Three were male, four were female, and five of the subjects were current soft contact lens wearers. All of the subjects had a comprehensive eye exam within the past two years, all had a best corrected visual acuity of 20/20 or better, all had between 0.75 and 2.75 DC of refractive astigmatism in at least one eye, all had normal eyelid position, without ocular disease, or allergies. None of the subjects were current RGP wearers. The refractive data of the 13 eyes are listed in Table 2.

TABLE 2: REFRACTIVE DATA OF THE 13 EYES

EYE	SPHERE	CYLINDER	AXIS	KERATOMETRY	▲K
1	-6.00	-1.25	050	44.50/46.00@126	1.50
2	-5.50	-2.75	145	44.12/46.12@058	2.00
3	-0.25	-0.75	058	43.50/44.37@114	0.87
4	-5.25	-1.00	085	46.75/47.12@138	0.37
5	-5.25	-0.75	075	46.62/46.75@020	0.12
6	+1.50	-1.50	083	46.25/46.62@087	0.37
7	+2.00	-1.00	095	46.12/46.62@097	0.50
8	-4.50	-1.00	070	45.25/46.25@138	1.00
9	-4.25	-1.25	085	45.62/46.50@006	0.87
10	-7.25	-1.50	170	46.12/47.62@068	1.50
11	-8.75	-2.00	165	46.00/47.25@090	1.25
12	-2.50	-1.50	174	43.00/45.00@091	2.00
13	-3.00	-1.00	180	43.00/45.00@097	2.00
		MEAN		RANGE	
	SPHERE	-3.77		+2.00 to -8.75	
	CYLINDER	-1.33		-0.75 to -2.75	
	FLAT K	45.14		43.00 to 46.75	
	STEEP K	46.25		44.37 to 47.62	
	▲K	1.10		0.12 to 2.00	

PROCEDURE

1. Snellen visual acuity was assessed with and without spectacle correction.
2. Manual and Auto Keratometry was used to measure corneal toricity.
3. Monocular refraction was performed using maximum plus lenses and Jackson Cross cylinder to determine best monocular acuity.
4. A thorough slit lamp examination was performed to determine ocular health.
5. Each subject was then fit with an appropriate power lens based on the spherical

equivalent of the monocular refraction and either an 8.7 or 8.4 Precision UV lens based on the initial Keratometry readings and refractive data.

6. The fit was judged as acceptable or unacceptable, and modified until acceptable.

7. After the lens had been on the eye for thirty minutes, Snellen visual acuity was measured.

8. Manual and Auto Keratometry readings were performed over the lens.

9. Auto refraction and manual sphere and sphere-cylindrical over-refractions were measured. The manual sphere-cylindrical over-refraction was used to determine masking effect.

10. Snellen visual acuity was measured through the spherical-cylindrical over-refraction to ensure that the patient was able to achieve the same acuity as with spectacle correction (20/20 or better).

11. Each subject evaluated the overall comfort of the lens after thirty minutes of wear on a scale of 1 to 10, with 1 being extreme irritation and 10 being unawareness of the lens.

Our procedure paralleled the general procedure used in Dr. Harris' study with the exception that they also measured visual acuity with a Bailey-Lovie logMAR contrast sensitivity chart, and they evaluated three lenses.

RESULTS

Overall, the refractive astigmatism masked by Precision UV averaged 0.69 +/- 0.94 DC and ranged from -0.25 (negative mask) to 1.50 (Graph 1). The overall refractive astigmatism masked by the comparative lenses in the Harris study were: CSI Clarity 0.14 +/-0.20 DC, Acuvue 0.28 +/- 0.36 DC, and Surevue 0.32 +/- 0.42 DC.

Precision UV masked some refractive astigmatism in all but three of the subjects, two of which showed a negative masking effect (an increase rather than a decrease in refractive cylinder). Refer to Graph 1 on the following page. Ten out of thirteen eyes were able to achieve Snellen 20/20 or better with the trial lens that was fit on their eye based on their Keratometry readings and refractive data.

Each subject rated the general comfort of Precision UV on their eye on a scale of 1 to 10, with 1 being irritation and 10 being no lens awareness. The comfort rating averaged a scored of 8.2, and ranged from 3 to 10 with no significant difference between the current lens wearers and the nonwearers.

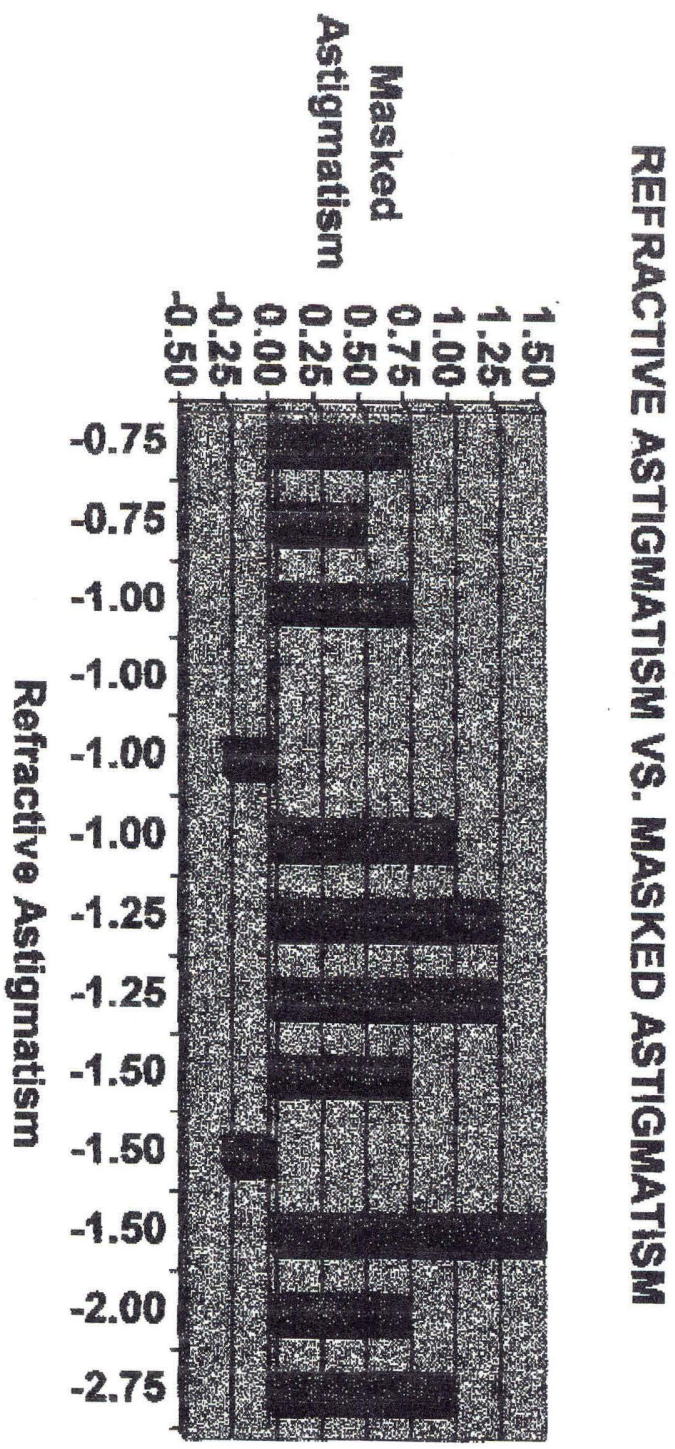
DISCUSSION

In practice, some practitioners will fit a spherical rigid gas permeable lens first on an astigmatic cornea because it creates a tear lens between the cornea and the RGP. Hydrogel lenses conform to the surface of the cornea and therefore do not form a tear lens which means that it does not correct astigmatism. Theoretically, spherical hydrogel lenses

in the high power
range or those that are thicker or made of a stiffer polymer can produce a masking effect because of incomplete draping about the toric cornea, thereby neutralizing some corneal cylinder.[1] RGPs have the benefits of: 1) quality of vision, 2) safety, 3) long term comfort, 4) durability, and 5) ease of care.[2] Probably the most important benefit is the quality of vision, especially in patients who are very critical of their acuity or require constant crisp vision.

What about the patients who cannot tolerate RGPs, but don't want to wear spectacle correction all of the time? Remba[4] suggested that a spherical hydrogen lens

GRAPH 1:


REFRACTIVE ASTIGMATISM VS. MASKED ASTIGMATISM
Masked Astigmatism
1.50
1.25
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
Refractive Astigmatism
-0.75
-0.75
-1.00
-1.00
-1.00
-1.25
-1.25
-1.50
-1.50
-1.50
-2.00
-2.75

should be tried in cases where the astigmatic correction is less than 25% of the spherical correction. In our study, seven of the eyes fell into the category of their astigmatism being 25% of less than the spherical component, and six out of those seven eyes were able to see 20/20 or better with the Precision UV lens selected for them. In general, high ametropic patients may be able to tolerate uncorrected cylinder better.[2]

Another alternative for the patient who cannot tolerate RGPs are soft hydrophilic toric lenses. However, these lenses have their shortcomings also. From the practitioner's point of view, the fitting process is more time consuming. From the patient's point of view, their vision is not a crisp 20/20 all of the time due to lens rotation on the eye, and these lens are generally more expensive.

Precision UV may appear to better mask astigmatism than CSI Clarity, Acuvue, or Surevue, but we cannot make that judgment with certainty because of the design of the study. Our sample size was small, and each patient was not fit with all four lenses.

In general, when fitting a contact lens, whether RGP, hydrogel, or specialty lenses, there are many considerations, such as comfort, wearing schedule, visual acuity, ease of handling, and the list goes on. In the case of a patient who has some corneal cylinder, yet wants to wear hydrogels, finding the right lens is like putting together a picture puzzle, you try until each piece fits in. In my clinical experience, a first time hydrogel contact lens wearer with a some corneal toroicity and some amount of refractive cylinder is often satisfied with the ease of handling and with their vision through Precision UV.

References

1. Harris, Michael G.,O.D., J.D., M.S.; Lau, Spencer, O.D.; Ma, Helen, O.D.; Tuan, Jeanie, O.D.; "Do Disposable Contact Lenses Mask Astigmatism?" Optical Prism, May/June 1996.

2. Bennett, Edward S. O.D., MSEd and Henry, Vinita Allee, O.D., Clinical Manual of Contact Lenses. J.B. Lippincott Company, 1994.

3. Precision UV (package insert), Pilkinton Barnes Hind, Sunnyvale, CA, November 1995.

4. Remba MB. "Clinical evaluation of Toric Hydrophilic Contact Lenses." II. Journal of the American Optometric Association. 1981; 52(3); 220.