THE SATURN II

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The Saturn II lens was designed with the goal of correcting corneal astigmatism to give good vision and at the same time provide adequate patient comfort. The lens is lathe cut from a single button. It is a lens designed in two phases consisting of a rigid oxygen permeable center surrounded by a hydrophilic skirt. A process of molecular interweaving joins the soft and rigid material synergicon A which has a number of desireable properties. The base curve of the lens is formed on the rigid center portion of the lens and the soft skirt has a peripheral curve six to seven diopters flatter than the base curve. The center has a surface that enhances wettability with a wetting angle of twenty one degrees and an index of refraction of 1.53. The hydrophilic skirt has mechanical strength and is very stable. Water absorption of the center is negligible, therefore in effect, decreasing the chance of harboring organisms or preservatives. The skirt absorbs twenty five percent water. The low water content of the skirt enhances the stability of the skirt and allows the center portion to float above the corneal apex. The concept of having the lens above the corneal apex allows the blinking lid to put pressure on the center, forcing it toward the cornea and causing the skirt to flare out and allow tear exchange under the lens.

The characteristics that apply to the hard gas permeable lenses apply to the Saturn II lens and the fitting characteristics of a soft lens applies to the skirt portion of the lens.

It is understood that soft lenses are comfortable because of their size versus their soft quality. The Saturn II lens has a diameter of 13mm in diameter which fulfills this criteria. The Saturn II lens resembles the movement of a soft lens in the eye and not the movement of a P.M.M.A. or rigid gas permeable lenses.

The lens parameters fall in the ranges as follows: Lens Power - +6.00 through +13.00 diopters in quarter diopter steps. Base Curves:- 7.20mm through 8.20mm in .10mm steps. Diameter - 13mm. Center thickness - in ranges of .08 to .28mm. Edge thickness is confined to a constant range and controlled by an anterior surface lenticular curve when needed. The tear film that forms under the Saturn II lens is able to correct corneal astigmatism between 1.50 and 4.00 diopters. Sodium flourescein should not be used in evaulating the fit, but rather a product called Flouresoft.

The Saturn II lens is designed to rest on the peripheral cornea with the center portion floating on the tear film layer over the central apex of the cornea. This concept allows the pumping action on blinking, therefore a lens that is fit too flat could actually cause a decrease in the movement of a lens by creating a negative pressure on the apex which causes an adherence of the lens to the cornea.

In a trial lens fitting the first lens selected should be on

the flat corneal curve for corneal toricity up to 1.50 diopters and .1mm steeper than K for 1.75 diopters of corneal toricity. A drop of saline solution should be placed in the center of the rigid portion before insertion to prevent bubbles from being trapped between the lens and corna. The bubbles if present will usually dissipate after twenty to thirty minutes. If the bubbles to not dissipate after thirty minutes, this indicates a steep fit. Other signs of a steep fit include vascular engorgement at the limbus and a Flouresoft pattern that shows bearing at the edge of the skirt. A lens fit too flat may be decentered usually down, nasal or temporal, but may be in any direction and will show minimal movement on a blink. The Flouresoft pattern wil show an area of bearing at the lens junction. Ideally, movement of 1mm to 1.5mm movement in a gliding motion should be seen, and Flouresoft is to be placed in the rigid portion of the lens before insertion and the practitioner should see a steady flow of the stain under the lens junction using an optic section type illumination with the biomicroscope.

The removal of the Saturn II lens is achieved differently than other rigid lenses. The most efficient way of removing the lens is to allow air under the lens by placing the index finger and thumb on the lower soft portion of the lens and form a buckle to allow an air passage to the center of the lens. Once this is

accomplished the lens can be removed by using the buckle as a handle and pulling the lens off. The Allergan Lens Cleaning and Disinfection Solution is recommended for the care of the lens. Heat disinfection is not to be used.

The patients fitted with the Saturn II lens in this project had corneal toricity ranging from 1.00 to 3.00 diopters of corneal toricity.

Subject 1

Keratometry 43.00/45.50 @ 90

Refraction +0.50=-1.75 x 175 20/20

Lens 1 Base Curve 7.8mm

Power -2.75 D

Over Refraction +3.25=-.50 x 175 20/20

Fit - Good centration, 1mm movement

Lens 2 Base Curve 7.9mm

Power -2.75 D

Over Refraction +3.50=-.50 x 175 20/20

Fit: Good centration, less than 1mm movement

Subject 2

Keratometry 43.75/45.00 @ 90

Refraction -3.75=-1.00 x 180 20/20

Lens 1 Base Curve 7.70mm

Power -2.75 D

Over Refraction -1.00 sphere 20/25

Fit - Good centration, 1mm movement

Lens 2 Base Curve 7.8mm

Power -2.75 D

Over Refraction plano=-.50 x 180 20/20

Fit- Good centration, 1mm movement

Subject 3

Keratometry 40.75/43.00 @ 90

Refraction -7.50 =-2.50 x 180 20/20

Base Curve 8.20mm

Power -2.75 D

Over Refraction - Unobtainable

Fit - Lens decenters nasally, diplopia reported

Subject 4

Keratometry 43.00/46.00 @ 90

Refraction -2.00=-3.00 x 180 20/20

Base Curve 7.80mm

Power -2.75 D

Over Refraction +.50=-.75 x 180 20/30

Fit - Good centration, 1mm movement, bubbles trapped under lens

Subject 5

Keratometry 42.25/43.25 @ 90

Refraction -2.00=-1.00 x 110 20/20

Lens 1 Base Curve 7.9mm

Power -2.75 D

Over Refraction - Unobtainable

Fit - Lens centers up, diplopia reported

Lens 2 Base Curve 8.1mm

Fit - lens centers up and out; diplopia reported

Lens 3 Base Curve 7.8mm

Fit - Lens centers up and out

Subject 6

Keratometry 41.50/43,25 @ 90

Refraction -3.50-1.00 x 175 20/20

Lens 1 Base Curve 8.10mm

Power -2.75 D

Fit - Lens decenters out; no movement; diplopia

Lens 2 Base Curve 7.9mm

Power -2.75 D

Over Refraction -.50=-.50 x 175 20/60

Fit - Decentered out

Lens 3 Base Curve 8.0mm

Fit - Lens moves temporally; diplopia

Subject 7

Keratometry 42.12/43.50 @ 88

Refraction -3.25=-1.00 x 004 20/20

Lens 1 Base Curve 8.2mm

Power -2.75 D

Fit - Centers temporally

Lens 2 Base Curve 7.90mm

Power -2.75 D

Over Refraction -.50=-.50 x 004 20/40

Fit - Slight temporal movement

Subject 8

Keratometry 40.75/42.00 @ 90

Refraction - Plano=-1.00 x 10 20/20

Base Curve 8.20mm

Power -2.75 D

Over Refraction =2.75 20/25

Fit - Good centration, 1+mm movement, bubbles under lens

Subject 9

Keratometry 44.00/46.25 @ 90

Refraction -3.00=-1.50 x 012 20/20

Lens 1 Base Curve 7.60mm

Power -2.75 D

Over Refraction -.50 sphere 20/20

Fit - Good centration, good movement

Lens 2 Base Curve 7.70mm

Power -2.75 D

Over Refraction -.50 sphere 20/20

Subject 10

Keratometry 43.75/45.75 @ 85

Refraction -3.50=-2.50 x 175 20/20

Lens 1 Base Curve 7.60mm

Power -2.75 D

Over Refraction -1.00=-.75 x 175 20/20

Fit - Good centration, good movement

Lens 2 Base Curve 7.70mm

Power -2.75 D

Over Refraction -.75=-.25 x 175 20/20

Fit - Good movement, good centrations

As one would expect, the lenses that centered well on the patients provided good acuity and comfort when they were fit on K and .1mm steeper. Acuities and comfort were reduced dramatically by any decentration of the lenses. Attempts were made to get proper centration by physically manipulating the lenses, changing base curves, but these attempts were unsuccessful.

Being able to obtain proper centration of the Saturn II lens on the eye seems to be the key factor in successfully correcting the corneal toricity. If proper centration is obtained, the probability of achieving good acuities is high.