

Accommodating lens

Dual-optic IOL effective answer to presbyopia

Pre-loaded injector simplifies surgery, allows easy lubrication

By Lynda Charters

Reviewed by Ivan Ossma-Gomez, MD

Chicago—The Synchrony Dual Optic Accommodating IOL (Visiogen) is an exciting option for patients with cataract and presbyopia. Researchers reported the results of the 2-year experience with the IOL at the annual meeting of the American Academy of Ophthalmology.

An important feature of the Synchrony IOL is that it seems to provide more accommodation than single-optic design accommodative IOLs as well as good near, intermediate, and distance vision, according to Ivan Ossma-Gomez, MD.

To date, more than 250 eyes have had the lens implanted at eight centers in Mexico, Colombia, Germany, and Canada. The manufacturer recently received approval from the FDA to begin implanting the IOL in the United States late last year, and the clinical trials started at the end of the fourth quarter of 2005. A new feature of this lens is that the manufacturer has developed an injector system to replace the forceps used to implant the lens when it initially became available. The lens is provided pre-loaded in the



The pre-loaded injector allows the surgeon simply to open the package, position the lens in three steps, and insert the lens through a small incision. (Photo courtesy of Visiogen)

power of the IOL is individualized, with a theoretical accommodation of 3.3 D, with 1.5 mm of anterior lens movement, Dr. Ossma-Gomez explained.

How it works

The IOL works in the following manner, according to the manufacturer.

The mechanism of action of this lens is based on a lens structure formed by two optics linked by a spring system that, when resting, produces an outward force separating the axis of the optics. When implanted within the capsular bag, bag tension compresses the optics reducing the interoptic separation.

injector system that allows insertion through a 3.6- to 3.8-mm clear-corneal incision.

“Correcting pseudophakic presbyopia might be the only remaining challenge in achieving the perfect cataract refractive procedure. We have alternative refractive options, such as multifocal IOLs; however, these lenses have optical tradeoffs, such as glare and halos, that could be bothersome to some patients,” Dr. Ossma-Gomez said.

The Synchrony IOL has a single-piece, silicone, dual-optic design. The 5.5-mm anterior optic is highly powered and is connected to a 6.0-mm negative-power posterior optic by haptics that have a spring-like action. The IOL has a high-power moving lens and a larger range of accommodation than a single-optic one. The IOL provides consistent accommodation for all patients, he explained. Dr. Ossma-Gomez is assistant professor of ophthalmology, Department of Ophthalmology, Fundacion Oftalmologica de Santander, Bucaramanga, Colombia.

The design of the lens is such that the front optic moves; it has a high plus of +32.0 D. The rear optic is patient dependent and varies with each patient depending on ciliary muscle movement. The net

The resting ciliary body maintains zonular tension that is transmitted to the bag, producing outward circumferential movement of the equator. Axial shortening of the capsular bag and compression of the lens results in the storage of strain energy in the connecting arms.

Stoppers are incorporated to control minimum separation of the lenses and maintain a very small space between the two lenses, thus setting the resting distance refraction at emmetropia. With accommodative effort, the zonules relax, releasing the tension on the capsular bag, thus allowing release of the strain energy stored in the interoptic articulations and anterior displacement of the anterior optic.

The posterior optic has a pair of stabilizers that reduces the tendency for posterior axial excursion and maintains stability and centration within the capsular bag during the accommodative process.

Results

The visual results reported thus far are good. In 23 eyes with the lens implanted by Dr. Ossma-Gomez that were followed for 2

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years, 83% of the eyes had 20/40 or better uncorrected distance visual acuity (VA) and 100% had distance-corrected VA of 20/40 or better. Regarding intermediate vision, 92% had 20/40 or better uncorrected VA and 96% had distance-corrected VA of 20/40 or better. And regarding near VA, 100% had both uncorrected VA of 20/40 or better and distance-corrected VA of 20/40 or better.

In eyes in which the IOLs were implanted using the new injector system, 87% of 32 eyes that had been followed for 1 month had an uncorrected distance VA of 20/40 or better and 80% of the 15 eyes that had been followed for 3 months had an uncorrected distance VA of 20/40 or better. Regarding intermediate VA, 93% of the 32 eyes followed for 1 month had an uncorrected VA of 20/40 or better and 87% of the 15 eyes followed for 3 months had uncorrected VA of 20/40 or better. Regarding near VA, 84% of the 32 eyes followed for 1 month had an uncorrected VA of 20/40 or better and 80% of the 15 eyes followed for 3 months had that level of vision.

Implantation procedure

The lens is implanted during a standard phacoemulsification procedure. A clear corneal incision (3.6 to 3.8 mm) is used to insert the lens.

When implanting this IOL, special care should be taken to create a “perfectly centered” continuous curvilinear capsulorhexis that is between 4.5 and 5.0 mm, according to Dr. Ossma-Gomez. After complete removal of the lens nucleus and cortical material, careful polishing of the anterior lens capsule is performed to diminish lens epithelial cell proliferation over the anterior capsule. The capsular bag is filled with viscoelastic, and the IOL is delivered using the

pre-loaded injection system. All the viscoelastic must be removed, with special attention to the space behind the posterior IOL and the gap between the two optics.

The pre-loaded injector became available in the fourth quarter of 2005 and is being used in the U.S. clinical trials that started at the same time. The injector, which houses the dual-optic IOL, is very simple to use and only requires a few steps for implantation. More importantly, only balanced saline solution is used for lubrication, without needing viscoelastic, thus reducing additional costs for this procedure.

After lubrication, the lens is folded and ready for injection in a single step into the capsular bag. The pre-loaded injector, which is supplied in a sterile peel pack, has a plunger design. Being preloaded, this injector eliminates the chances of mishandling of the lens or tearing an optic, and further reduces chances of the development of endophthalmitis.

“It is important to realize that with all accommodating lenses that rely on the focus shift principle, the amount of refractive change that is achieved is proportional to the magnitude of axial displacement and the power of the lens optic,” he said.

For a single-optic accommodating IOL, the most accommodation that could be induced theoretically would be about 1.9 D but could be as little as 1.3 D. This dual-optic design is unique in that it yields higher refractive change per unit of lens displacement because the anterior optic is highly powered,” Dr. Ossma-Gomez stated. **OT**

FYI

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