Abstracts

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Central Corneal Thickness Measurements Using Orbscan II, Visante, Ultrasound, and Pentacam Pachymetry After Laser in Situ Keratomileusis for Myopia

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Accurate measurement of corneal thickness is important in corneal refractive procedures, especially laser in situ keratomileusis (LASIK), which is currently the most popular approach for the correction of refractive errors. This measurement allows determination of the extent of safe stromal ablation possible because it is now believed that iatrogenic keratectasia can result from excessive tissue removal in the stromal bed. This may be particularly important in patients who had laser refractive surgery with suboptimal outcomes and are being considered for an enhancement procedure.

The current gold standard for corneal pachymetry is applanation ultrasound (US) pachymetry, although errors caused by the indentation of the cornea have been reported. Concerns about the possibility of patient discomfort, epithelial damage, and spread of infections with contact methods also exist.

Today, several non contact devices that allow assessment of corneal thickness are available. The Orbscan (Orbtek, Bausch & Lomb) corneal topography system measures corneal thickness by analyzing images of the anterior and posterior corneal reflecting surfaces based on slit-scanning technology and videokeratography. Using an acoustic adjustment factor, which can be customized for each unit, the second version of Orbscan (Orbscan II) gives results comparable to those of US pachymetry in pre-LASIK patients. However, it has been reported that in post-LASIK patients, Orbscan measurements underestimate corneal thickness despite the use of a customized acoustic factor.

The Visante device (Carl Zeiss Meditec) uses high-resolution, non contact optical coherence tomography (OCT), customized for anterior segment evaluation. It allows assessment of corneal thickness across the entire corneal surface without direct contact. The image-acquisition system provides a video image of the examined zone and stores the last 7 images at a rate of 8 frames per second. At the end of the examination, the software interprets the selected image and the image is reconstructed to provide pachymetry information.

The Pentacam device (Oculus, Germany) uses the Scheimpflug principle to acquire cross-sectional images of the cornea and lens. It has been used in the assessment of cataract and for measuring corneal curvature and thickness. It is a rotating camera that offers a noninvasive assessment of the anterior segment of the eye. Data on topographic corneal thickness, curvature, anterior chamber angle, volume, and height are calculated from up to 25 000 data points.

The purpose of this study was to compare corneal pachymetry assessment using 4 measurement methods in eyes after laser in situ keratomileusis (LASIK) for myopia.

Fifty-two consecutive patients (103 eyes) who had LASIK for the correction of myopia had Orbscan II (Bausch & Lomb), Visante (Carl Zeiss Meditec), Pentacam (Oculus, Inc.), and ultrasound (US) pachymetry (Sonomed, 200P) 6 months after surgery.

The mean postoperative pachymetry measured by US, Orbscan (0.89 acoustic factor), Pentacam, and Visante pachymetry were 438.2 µm ± 41.18 (SD), 435.17 ± 49.63 µm, 430.66 ± 40.23 µm, and 426.56 ± 41.6 µm, respectively. Compared with the US measurement, Pentacam and Visante measurements significantly underestimated corneal thickness by a mean of 7.54 ± 15.06 µm ($P<.01$) and 11.64 ± 12.87 µm ($P<.01$), respectively. There was no statistically significant difference between US and Orbscan measurements.

Authors concluded with the remarks that pentacam and Visante measurements of corneal thickness 6 months after LASIK were significantly less than those obtained using Orbscan and US pachymetry, although all 4 measurement methods showed a high correlation with each other.

Phacotrabeculectomy: Assessment of outcomes and surgical improvements

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Since the term phacotrabeculectomy was first introduced in the literature in 1991, the combined procedure of phacoemulsification, posterior chamber intraocular lens (IOL) implantation, and trabeculectomy has been advocated for treating coexisting glaucoma and cataract. With the improvement in both phacoemulsification and trabeculectomy, phacotrabeculectomy continues to gain popularity among ophthalmic surgeons.

The purpose of this study was to evaluate the outcomes and progress after phacotrabeculectomy at the same clinical setting and/or performed by the same surgeon over the past decade.

This retrospective study included 60 eyes of 43 patients who had phacotrabeculectomy at a single institute between 1999 and 2005. A modified phacotrabeculectomy surgical technique was used that included a 2-site incision approach, fornix-based flap, use of mitomycin C, acrylic intraocular lens implantation, sutured scleral and conjunctival flaps, and sutured temporal clear corneal incision.

Over a mean 30-month follow-up, 57 of the 60 eyes (95%) achieved intraocular pressure (IOP) control (< 21 mm Hg) with or without medication. Thirty eyes (50%) had an IOP of 15 mm Hg or lower, and 34 (57%) had an IOP reduction of at least 30%. The IOP decreased from a preoperative mean of 23.1 mm Hg on a mean number of 1.67 glaucoma medications to a mean of 14.9 mm Hg on a mean of 0.23 medication at the final follow-up (P<.001 for IOP decrease and for reduction in number of medications). Fifty-two eyes (87%) obtained a best spectacle-corrected visual acuity of 20/40 or better. Dysesthetic blebs requiring surgical revision and bleb hemorrhage (each occurring in 2 eyes, 3.3%) were seen in this study, but not previous studies.

Authors concluded with the remarks that the surgical technique used in this study appears to be effective and superior to a previous technique at restoring visual acuity, lowering IOP, and reducing the postoperative complication rate.

Prospective Visual Evaluation of Apodized Diffractive Intraocular Lenses

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Multifocal intraocular lenses (lOLs) are designed to reduce dependence on eyeglasses after cataract surgery and are gaining acceptance as a potential refractive surgical option in selected patients. Monofocal lOLs provide excellent visual function; however, for many patients, the lOL's limited depth of focus means that they cannot provide clear vision at both distance and near. Patients with traditional monofocal lOLs usually require glasses for near distance tasks such as reading. Monovision techniques may be helpful in some patients but involve sacrifices in binocularity.

Multifocal lOLs, which were introduced in the early 1980s, may offer patients the potential for a range of uncorrected vision from near to far. Multifocality is the brain's natural ability to adapt to near and far vision as it chooses between the 2 (near and far) images produced by the different optical elements of the IOL, depending on what it is looking at. These simultaneous-vision lOLs provide distance, intermediate, and near correction within the area of the ocular pupil. When a distant object is being viewed, a sharp retinal image is provided by the parts of the IOL within the pupillary area that have the distance correction and a somewhat blurred image by the other parts of the IOL, these images being superimposed on the retina. The decrease in contrast of the in-focus image is produced by the split of total light energy between the far focus and near focus, while the contemporary presence (superimposition) on the retina of an in focus image and out-of-focus image can produce a sort of retinal rivalry or confusion that is overcome by the brain's selection of the best retinal image and capability to use multifocality.

Many studies to overcome this drawback have been performed. One proposed solution is to direct different amounts of the refracted-diffracted light on the different foci, thus favoring distance or near vision. Another approach comes from the pupil and the optical design of the IOL, which create different amounts of light on the different foci depending on

pupil diameter. However, reduced image contrast and unwanted visual phenomena, including glare and halos, have been associated with multifocal IOL performance.

Newer multifocal IOL models have improved the visual outcomes over those achieved with older designs; however, the visual performance of these lOLs has not been fully evaluated. A popular currently used diffractive multifocal IOL is the AcrySof ReSTOR (Alcon). Recent studies report satisfactory visual results with this IOL. However, no studies have been performed to assess the visual performance of this new IOL in a large population over a long follow-up period.

The purpose of this study was to evaluate distance, intermediate, and near visual performance in patients who had multifocal apodized diffractive intraocular lens (IOL) implantation.

The best corrected distance visual acuity, best distance-corrected near visual acuity, intermediate visual acuity, distance contrast sensitivity under photopic and mesopic conditions, and patient satisfaction were measured in 325 patients and 335 patients who had bilateral implantation of the model SA60D3 IOL (AcrySof ReSTOR, Alcon) and model SN60D3 IOL (AcrySof Natural ReSTOR), respectively.

At the 6-month postoperative visit, binocular best corrected distance acuity with the ReSTOR IOL and the Natural ReSTOR IOL was 0.034 logMAR ± 0.004 (SD) and 0.019 ± 0.020 logMAR, respectively (~20/20). Binocular best distance-corrected near acuity was 0.011 ± 0.012 logMAR and 0.035 ± 0.013 logMAR, respectively (~20/20). Intermediate visual acuity with both IOL models worsened significantly as a function of the distance of the test (P<.01). Photopic contrast sensitivity was within the standard normal range with both lOLs. Under mesopic conditions, contrast sensitivity with both lOLs was comparable to that with monofocal lOLs and lower, particularly at higher spatial frequencies, than under photopic conditions. No statistically significant differences in visual acuity or photopic and mesopic contrast sensitivity were found between the 2 IOL models (P>.1). A patient satisfaction questionnaire showed that both lOLs performed well and were comparable in satisfaction regarding distance, intermediate, and near activities under different lighting conditions.

Authors concluded with the remarks that AcrySof ReSTOR IOL and AcrySof Natural ReSTOR IOL provided good visual performance at distance and near under photopic and mesopic conditions. Intermediate vision with both models was reduced compared with distance and near vision.

Visual Acuity and Contrast Sensitivity: Acrysof Restor Apodized Diffractive Versus Acrysof SA60AT Monofocal Intraocular Lenses

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The treatment of presbyopia is a challenge for ophthalmic surgeons. The choices include implant-tation of multifocal intraocular lenses (lOLs). According to the current literature, these lOLs improve near vision without a major adverse effect on distance vision.

In addition, the functional status and quality of life of patients with multifocal lOLs have been reported to be better than in patients with monofocal lOLs. However, significant shortcomings, such as halos, glare, and loss of contrast sensitivity, especially in dim light, have been reported with multifocal lOLs. The AcrySof ReSTOR apodized diffractive IOL (Alcon) has a single-piece biconvex optic. The optic is of a high-refractive-index (1.55) hydrophobic, flexible, acrylic material with ultraviolet wavelength absorbing properties. The anterior surface has apodized diffractive concentric rings in the central 3.6 mm area, distributing light for a full range of vision. Step heights decrease smoothly from 1.3 mm in the central zone to 0.2 mm at the diffractive periphery. The IOL incorporates a +4.0 diopter (D) addition (add) lens plane equal to a + 3.2 D at the spectacle plane. This allows optimum near vision approximately 31 cm from the eye. The 2 technologies in the ReSTOR-apodization and the diffractive optic reduce the light transmission loss that is common with other diffractive IOLs.

The purpose of this study was to compare the visual acuity and contrast sensitivity in eyes with the AcrySof ReSTOR multifocal intraocular lens (IOL) (Alcon) and eyes with the monofocal AcrySof SA60AT IOL.

One hundred eyes had phacoemulsification cataract extraction and implantation of a ReSTOR multifocal IOL in the capsular bag. Inclusion criteria were corneal astigmatism less than 1.5 diopters (D), myopia less than 4.0 D, and no associated ocular disease. A complete ophthalmic examination,

including uncorrected visual acuity, best spectacle-corrected visual acuity, and contrast sensitivity, was performed 6 months postoperatively. Results were compared with those in 40 eyes with the AcrySof monofocal IOL single-piece IOL.

In the multifocal group, 90 eyes (90%) had an uncorrected distance visual acuity of 20/25 or better (logMAR <0.10) and an uncorrected near visual acuity at 35 cm of J3 or better (logMAR 0.14). The multifocal group and monofocal group had similar distance uncorrected and best corrected visual acuities; however, the multifocal group had significantly better near uncorrected acuity. The mean contrast sensitivity values were 18.28 dB (static program) and 17.95 dB (dynamic program) in the multifocal group and 19.18 dB (static program) and 21.2 dB (dynamic program) in the monofocal group.

Authors concluded with the remarks that ReSTOR multifocal IOL provided a satisfactory full range of vision; 92% of the patients achieved total spectacle independence. Contrast sensitivity was lower than with the SA60AT monofocal IOL.

Intraocular Lens Centration and Visual Outcomes After bag-in-the-Lens Implantation

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Many intraocular lens (IOL) designs have been developed since Ridley's original model in 1949. The conventional IOL implantation technique consists of inserting the IOL in the capsular bag, which is called the lens-in-the-bag (LIB) implantation technique. This method inevitably leads to a large area of contact between the IOL biomaterial and capsular bag. The capsular bag response, described as a foreign-body reaction of lens epithelial cells (LECs) against the IOL biomaterial, results in the stimulation of LECs lying at the surface of the anterior capsule, causing anterior capsule opacification (AGO), and of equatorial LECs, causing posterior capsule opacification (PCO).

Posterior capsule opacification can be very mild or severe according to the biomaterial. In cases of severe PCO, patients have a reduction in visual acuity, which can be treated by a neodymium: YAG (Nd: YAG) laser capsulotomy. The lowest Nd: YAG laser capsulotomy rates found in the literature reach 10.4% 5 years after surgery.

A bag-in-the-lens (BIL) IOL (model 89A, Morcher) was introduced in 2000. The BIL IOL consists of a central optic surrounded by a groove defined by 2 oval heptics perpendicularly oriented to each other.

The purpose of this study was to examine the centration and visual outcomes after cataract surgery using the bag-in-the-lens (BIL) implantation technique.

This study comprised 180 eyes of 125 patients who had cataract surgery with implantation of the BIL intraocular lens (IOL) between March 2002 and September 2005. Postoperative data at 5 weeks, 6 months, and 1 year were evaluated. The geometric center of the IOL, measured on a red reflex slitlamp photograph, was compared with the geometric center of the pupil and the limbus.

The mean decentration compared with the limbus was 0.304 mm ± 0.17 (SD) at a mean angle of -24.9 ± 113.3 degrees. Compared with the dilated pupil, the mean deviation was 0.256 ± 0.15 mm at a mean angle of -5.2 ± 119.0 degrees. The amount of decentration was stable during the postoperative follow-up period. There was no correlation between the amount of decentration and the visual outcomes (pupil: r = -0.07, P = .494; limbus: r = 0.11, P = .304).

Authors concluded with the remarks that surgeon controlled BIL centration was predictable 5 weeks and unchanged 6 months and 1 year postoperatively. It can therefore be concluded that capsular bag healing has no influence on BIL IOL centration over time.