Anterior Versus Posterior Phakic IOLs

What is the best lens?

BY JOSE L. GÜELL, MD, AND ROBERTO ZALDIVAR, MD

Phakic IOLs have recently become a popular option for refractive correction. Some surgeons use them in patients who are poor candidates for laser vision correction, and other surgeons introduce them to patients as a premium solution to refractive correction. The great debate of LASIK versus phakic IOLs will continue to surface. However, this article focuses on another debate surrounding the use of phakic IOLs: What is the best choice, anterior or posterior chamber phakic lenses?

Implanted in front of the crystalline lens, phakic IOLs may either be fixated in the anterior chamber angle or attached to the front of the iris (ie, anterior chamber) or sit between the back surface of the iris and the front surface of the crystalline lens (ie, posterior chamber). Each technique has its own pros and cons. In this article, two surgeons present five reasons to defend his lens of choice.

ANTERIOR CHAMBER PHAKIC IOLs

By Jose L. Güell, MD

The following are five reasons to defend the use of anterior chamber phakic lenses. I would like to clarify that my defense focuses on the Artisan-Artiflex group (Ophtec BV; Groningen, Netherlands; distributed in the United States as Verisyse-Veriflex, Abbott Medical Optics Inc., Santa Ana, CA) and under some circumstances on the AcrySof Cachet (Alcon Laboratories, Inc., Fort Worth, TX).

Reason No. 1: Positive long-term safety data (5-10 years) is available and published for most of these lenses and models.[1,2] Some of these studies are company driven; however, most originate from the retrospective or prospective experience of several investigators.

Reason No. 2: The main concern with anterior chamber phakic IOLs (almost the only one) is chronic endothelial cell loss. Once the loss is considered unacceptable (ie, higher than physiological), the lens may be explanted without the need for any additional treatment. This is an important difference from posterior chamber phakic IOLs, for which cataract and pigmentary glaucoma are the main concerns. With both of these conditions, additional treatment is necessary.

> "I have had a positive experience with anterior chamber phakic IOLs for the past 15 years. Therefore, I have a lot of confidence in these lenses."

Reason No. 3: Especially with the iris–fixation-style phakic IOLs, we can perfectly center over the pupil (decentered pupils are common in ammetropic eyes) and fixate on the proper axis (for astigmatism correction), which provides obvious optical advantages.

Reason No. 4: In most cases, the higher the myopia, the deeper the anterior chamber, with the posterior chamber's remaining a constant size. For this reason—although with a smaller optical zone—we have a disproportionate number of anterior chamber phakic IOLs for the higher conditions versus posterior chamber phakic IOLs.

Reason No. 5: Last but not least, I have had a positive experience with anterior chamber phakic IOLs for the past 15 years. Therefore, I have a lot of confidence in these lenses. ■

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INDICATIONS AND USAGE
NEVANAC® ophthalmic suspension is indicated for the treatment of pain and inflammation associated with cataract surgery.

CONTRAINDICATIONS
NEVANAC® ophthalmic suspension is contraindicated in patients with previously demonstrated hypersensitivity to any of the ingredients in the formulation or to other NSAIDs.

WARNINGS
There is the potential for cross-sensitivity to acetylsalicylic acid, phenylacetic acid derivatives, and other nonsteroidal anti-inflammatory agents. Therefore, caution should be used when treating individuals who have previously exhibited sensitivities to these drugs.

With some nonsteroidal anti-inflammatory drugs including NEVANAC®, there exists the potential for increased bleeding time due to interference with thrombocyte aggregation. There have been reports that ocularly applied nonsteroidal anti-inflammatory drugs may cause increased bleeding of ocular tissues (including hyphemas) in conjunction with ocular surgery.

PRECAUTIONS
General: Topical nonsteroidal anti-inflammatory drugs (NSAIDs) including NEVANAC®, may slow or delay healing. Topical corticosteroids are also known to slow or delay healing. Concomitant use of topical NSAIDs and topical steroids may increase the potential for healing problems.

Use of topical NSAIDs may result in keratitis. In some susceptible patients, continued use of topical NSAIDs may result in epithelial breakdown, corneal thinning, corneal erosion, corneal ulceration or corneal perforation. These events may be sight threatening. Patients with evidence of corneal epithelial breakdown should immediately discontinue use of topical NSAIDs including NEVANAC® and should be closely monitored for corneal health.

Postmarketing experience with topical NSAIDs suggests that patients with complicated ocular surgeries, corneal denervation, corneal epithelial defects, diabetes mellitus, ocular surface diseases (e.g., dry eye syndrome), rheumatoid arthritis, or repeat ocular surgeries within a short period of time may be at increased risk for corneal adverse events which may become sight threatening. Topical NSAIDs should be used with caution in these patients.

Postmarketing experience with topical NSAIDs also suggests that use more than 1 day prior to surgery or use beyond 14 days post surgery may increase patient risk for occurrence and severity of corneal adverse events.

It is recommended that NEVANAC® ophthalmic suspension be used with caution in patients with known bleeding tendencies or who are receiving other medications which may prolong bleeding time.

Information for Patients: NEVANAC® ophthalmic suspension should not be administered while wearing contact lenses.

Carcinogenesis, Mutagenesis, Impairment of Fertility: Nepafenac has not been evaluated in long-term carcinogenicity studies. Increased chromosomal aberrations were observed in Chinese hamster ovary cells exposed *in vitro* to nepafenac suspension. Nepafenac was not mutagenic in the Ames assay or in the mouse lymphoma forward mutation assay. Oral doses up to 5,000 mg/kg did not result in an increase in the formation of micronucleated polychromatic erythrocytes *in vivo* in the mouse micronucleus assay in the bone marrow of mice.

Nepafenac did not impair fertility when administered orally to male and female rats at 3 mg/kg (approximately 90 and 380 times the plasma exposure to the parent drug, nepafenac, and the active metabolite, amfenac, respectively, at the recommended human topical ophthalmic dose).

Pregnancy: Teratogenic Effects.

Pregnancy Category C: Reproduction studies performed with nepafenac in rabbits and rats at oral doses up to 10 mg/kg/day have revealed no evidence of teratogenicity due to nepafenac, despite the induction of maternal toxicity. At this dose, the animal plasma exposure to nepafenac and amfenac was approximately 260 and 2400 times human plasma exposure at the recommended human topical ophthalmic dose for rats and 80 and 680 times human plasma exposure for rabbits, respectively. In rats, maternally toxic doses ≥10 mg/kg were associated with dystocia, increased postimplantation loss, reduced fetal weights and growth, and reduced fetal survival.

Nepafenac has been shown to cross the placental barrier in rats. There are no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, NEVANAC® should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Non-teratogenic Effects: Because of the known effects of prostaglandin biosynthesis inhibiting drugs on the fetal cardiovascular system (closure of the ductus arteriosus), the use of NEVANAC® ophthalmic suspension during late pregnancy should be avoided.

Nursing Mothers: NEVANAC® ophthalmic suspension is excreted in the milk of pregnant rats. It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when NEVANAC® ophthalmic suspension is administered to a nursing woman.

Pediatric Use: The safety and effectiveness of NEVANAC® in pediatric patients below the age of 10 years have not been established.

Geriatric Use: No overall differences in safety and effectiveness have been observed between elderly and younger patients.

ADVERSE REACTIONS
In controlled clinical studies, the most frequently reported ocular adverse events following cataract surgery were capsular opacity, decreased visual acuity, foreign body sensation, increased intraocular pressure, and sticky sensation. These events occurred in approximately 5 to 10% of patients.

Other ocular adverse events occurring at an incidence of approximately 1 to 5% included conjunctival edema, corneal edema, dry eye, lid margin crusting, ocular discomfort, ocular hyperemia, ocular pain, ocular pruritus, photophobia, tearing and vitreous detachment.

Some of these events may be the consequence of the cataract surgical procedure.

Nonocular adverse events reported at an incidence of 1 to 4% included headache, hypertension, nausea/vomiting, and sinusitis.

DOSAGE AND ADMINISTRATION
Shake well before use. One drop of NEVANAC® ophthalmic suspension should be applied to the affected eye(s) three-times-daily beginning 1 day prior to cataract surgery, continued on the day of surgery and through the first 2 weeks of the postoperative period.

NEVANAC® ophthalmic suspension may be administered in conjunction with other topical ophthalmic medications such as beta-blockers, carbonic anhydrase inhibitors, alpha-agonists, cycloplegics, and mydriatics.

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Manufactured by:
Alcon Laboratories, Inc.
Fort Worth, TX 76134 USA
U.S. Patent No: 5,475,034

References:
1. Data on file. Alcon Laboratories, Inc. 2005. **2.** Ke T-L, Graff G, Spellman JM, Yanni JM. Nepafenac, a unique nonsteroidal prodrug with potential utility in the treatment of trauma-induced ocular inflammation, II: in vitro bioactivation and permeation of external ocular barriers. *Inflammation.* 2000;24:371-384. **3.** Lane SS, Modi SS, Holland EJ, et al. Nepafenac ophthalmic suspension 0.1% before and after surgery for postoperative anterior segment inflammation. Paper presented at: American Society of Cataract and Refractive Surgery; April 19, 2005; Washington, DC. **4.** NEVANAC® suspension prescribing information.

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1. Guell JL, Morral M, Gris O, et al. Five-year follow-up of 399 phakic Artisan-Verisyse implantation for myopia, hyperopia, and/or astigmatism. *Ophthalmology*. 2008;115(6):1002-1012.
2. Tahzib NG, Nuijts RM, Wu WY, et al. Long-term study of Artisan phakic intraocular lens implantation for the correction of moderate to high myopia. Ten-year follow-up results. *Ophthalmology*. 2007;114(6):1133-1142.

POSTERIOR CHAMBER PHAKIC IOLs

By Roberto Zaldivar, MD

Reason No. 1: The surgical technique for implanting a posterior chamber phakic IOL allows an incision of 3 mm or slightly less. Such incision sizes induce only a small amount of corneal astigmatism. Once familiar with the technique, implantation is easy in experienced hands.

Reason No. 2: After 20 years of experience with different types of phakic IOLs, I believe that posterior chamber phakic IOLs interact with the endothelium better than anterior chamber phakic IOLs.

> "Because of [the IOL's] placement behind the iris, complications and visual side effects such as halo and glare are minimal."

Reason No. 3: Available posterior chamber phakic IOLs are made of excellent material, thus allowing better intraocular tolerance and producing fewer cases of photic phenomena.

Reason No. 4: Because of its placement behind the iris, complications and visual side effects such as halos and glare are minimal. This coincides with the lens' material and its interaction with the endothelium.

Reason No. 5: The posterior chamber is the natural place for an IOL inside the eye. This position drastically reduces the amount of light reflection on the surface and any complication this may cause. It also helps to avoid the mirror effect of potential iris deformities, especially during the nighttime. ■

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