The Dawn of Presby-LASIK

There are specific indications for this presbyopia-correcting treatment.

BY GUSTAVO TAMAYO, MD

Presby-LASIK is the name given to the surgical correction of presbyopia with an excimer laser ablation. It includes all types of excimer surgery, from surface ablation to femtosecond LASIK. Several ablation profiles for presby-LASIK have been described, but the two most important are central treatment for near vision and central treatment for distance. In the central near vision treatment, the ablation profile creates a distance vision zone in the periphery of the cornea and a near vision zone in the center of the cornea. The opposite is true in central distance vision treatments, in which the central cornea is ablated for distance vision and the periphery for near. In both circumstances, the final product is the creation of a multifocal cornea.

INDICATIONS FOR PRESBY-LASIK

Generally, presby-LASIK is indicated for any patient with presbyopia whose cornea meets the criteria for laser vision correction. Before suggesting presby-LASIK as a treatment option, the surgeon must ensure that the patient's corneal and biomechanical properties are well suited for excimer laser surgery. Several specific indications for this surgery must be considered:

• Presby-LASIK is better suited for young presbyopes (40–55 years of age) whose crystalline lens is still transparent and in whom intraocular surgery may be too risky. These patients usually have large pupils, which can produce unwanted side effects and symptoms if a multifocal IOL is implanted. On the contrary, the multifocal cornea works better in big pupils.

• When presbyopia and astigmatism are both present, presby-LASIK is indicated over any other type of correction. Astigmatism correction is more accurate with excimer laser ablation compared with toric IOLs or corneal incisions.[1]

• Presby-LASIK is also indicated in eyes in which a monofocal IOL was previously implanted. This surgery

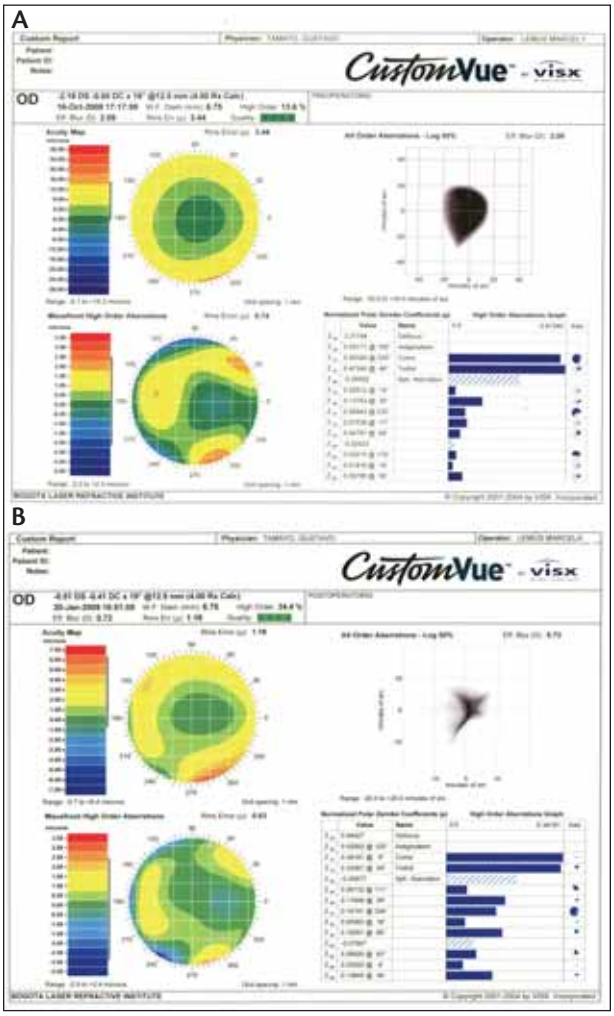

Figure 1. (A) Preoperative wavefront map of a 56-year-old patient with myopic astigmatism and presbyopia. The patient was treated almost 2 years ago. (B) The postoperative wavefront map shows improvement in refraction and preservation of the Z4 and Z6 aberrations, which are responsible for near vision. The patient's UCVA is 20/25 for distance and J1 for near.

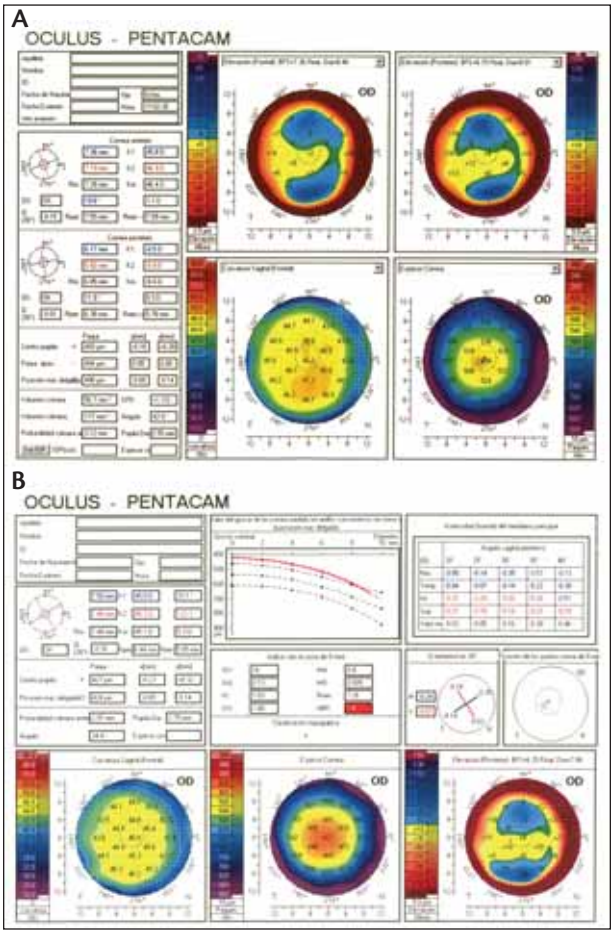

Figure 2. Pentacam (A) preop and (B) 2 years postop of the same patient described in Figure 1.

not only corrects any existing refractive defect but also adds multifocality to the cornea, helping the patient to decrease spectacle dependence for near vision.[2]

• Any potential refractive surgery patient over the age of 40 years who has a clear lens, regardless of the refractive defect, should be considered for presby-LASIK. This strategy avoids the onset of presbyopic problems with near vision. This is particularly true in myopic patients over the age of 40 years, who usually have excellent near vision that could be damaged by myopic correction with the laser.

CONTRAINDICATIONS

Contraindications can be divided into relative and definitive. Relative contraindications include:

• Extreme refractive defects such as high myopia, high hyperopia, or some forms of oblique astigmatism.

• Corneas that have previously undergone surgery such as incisional surgery. This type of surgery can still be performed in these eyes provided the optical zone is sufficiently large and there is no irregular astigmatism.

• Patients over the age of 65 years, who are naturally at risk for developing a cataract. An IOL must be considered in these patients.

Definitive contraindications include:

• Any cornea that does not qualify for excimer laser surgery, such as thin corneas and those with signs of keratoconus.

• Previous corneal surgery, particularly incisional surgery, resulting in a small optical zone or irregular astigmatism.

• Eyes with ocular diseases such as maculopathy or cataract.

> Presby-LASIK is well suited for repeated treatment in advancing presbyopia.

ADVANTAGES AND DISADVANTAGES

Advantages. Presby-LASIK is not a new technique for the general ophthalmologist, and therefore the pre- and postoperative processes are familiar. Additionally, patients are accustomed to this type of procedure because refractive surgeons have been practicing excimer laser surgery for 25 years. Another advantage is that the complication rate is low,[3-5] and complications are manageable without leaving permanent visual damage. Because it is completely extraocular surgery, there is no risk of permanent visual damage. In fact, presby-LASIK is completely reversible, which is probably its greatest advantage. A wavefront-guided ablation can erase the multifocality of the cornea and return it to its previous state. Lastly, presby-LASIK is repeatable, provided the cornea meets the parameters of excimer laser surgery in terms of biomechanical properties. This makes presby-LASIK well suited for repeated treatment in advancing presbyopia.

Disadvantages. The main disadvantage of presby-LASIK is the temporal nature of this procedure as a sur-

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TAKE-HOME MESSAGE

• The two most important presby-LASIK ablation profiles are central treatment for near vision and central treatment for distance.

• Both profiles create a multifocal cornea.

• The greatest advantage of presby-LASIK is its reversibility; its greatest disadvantage is that it induces only a temporary change as the disease progresses.

Phakic IOLs may also be implanted after CXL, ICRS implantation, or DALK.

form LASIK instead in approximately 14% of these patients, and in about 8% of cases a second laser enhancement is necessary. I choose the toric ICL for correction of ametropia after corneal grafts (STAAR Surgical, Monrovia, California) slightly more often than LASIK because it has a better predictability.

We recently conducted a study in 23 eyes of 17 patients with stable keratoconus, a clear central cornea, and intolerance to rigid contact lens. All patients had a BCVA of 20/40 or better, manifest refraction spherical equivalent between -4.00 and -15.00 D, and a stable manifest refraction for at least 1 year. Additional inclusion requirements were an endothelial cell count greater than 2,200 cells/mm^2 and an anterior chamber depth of at least 2.7 mm as measured from the endothelium.

In each eye, a posterior chamber toric ICL was implanted through a clear corneal incision. Twelve months postoperatively, UVCA was 20/40 or better in 90% of eyes and 20/20 or better in 55%. Additionally, 20% of eyes gained 2 or more lines of BCVA. We concluded that the toric ICL is a safe, effective, and predictable treatment for myopic astigmatism associated with stable keratoconus. Longer-term follow-up is necessary in a larger cohort of patients to ensure that results are stable as the disease progresses.

CONCLUSION

Keratoconus commonly presents during patients' second decade of life, with gradual progression in most eyes. In such cases, phakic IOLs can provide fast rehabilitation and a wide range of correction of stable refractive error, including myopia and compound myopic astigmatism. When a toric ICL is used to correct compound myopic astigmatism, the only differences in technique from a spherical ICL are marking the axis on which the lens will be implanted and properly aligning the lens inside the eye (Figure 4). Phakic IOLs may also be implanted after CXL, ICRS implantation, or DALK.

This tool has found a niche in the refractive market because it does not weaken the cornea nor compromise the quality of vision, it is highly predictable, and it can be removed or exchanged. ■

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gical correction of presbyopia. Because presbyopia is progressive, it is reasonable to expect a decreased surgical effect over time. This procedure also has high technology requirements and a demanding surgical technique. When it is performed as an intrastromal ablation procedure, larger flaps than those used in standard LASIK and other femtosecond-assisted surgeries are required. One must be sure that no aberrations are induced by these larger flaps, such as by wrinkles or folds.

The preoperative examination must be flawless, and patients must be informed that presby-LASIK can produce the same visual symptoms as multifocal IOLs, such as halos and glare at night, decreased contrast sensitivity, and possibly blurred distance vision. However, patients can be told that contrast sensitivity should return to normal levels after 3 to 6 months. When a cataract develops, the presence of this multifocal cornea can make IOL power calculation difficult. However, new programs using elevation topography are being developed to overcome this difficulty. In any case, miscalculation can be corrected with a wavefront ablation that erases multifocality and allows the power of the IOL to predominate.[6]

CONCLUSION

Presby-LASIK is a safe and effective alternative for the surgical correction of presbyopia. It is better suited for young presbyopes in whom the risk for intraocular surgery is high. It is also indicated in the presence of other refractive defects, particularly astigmatism. The greatest advantage of this procedure is that it can be reversed, for which I use CustomVue (Abbott Medical Optics Inc., Santa Ana, California) corneal ablation.[7] ■

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