



REFRACTIVE SURGERY

OCULAR SURGERY NEWS U.S. EDITION December 15, 2002

At Issue: Refractive procedures in 2010

Q: At Issue posed the following question to a panel of experts: "What will be the dominant refractive procedure in 2010?"

A: LASIK, vector planning

Noel A. Alpins, MD: LASIK is a seductive technology that re-established the "wow" factor lacking in its predecessor, photorefractive keratectomy. LASIK will dominate other modes of refractive surgical treatment through 2010 and beyond, due to its increasing acceptability and consequent continued growth.

The question that arises is what modifications are likely to be made to this refractive treatment to enhance patient satisfaction and outcomes. No doubt before 2010, the ablation profile will also address corneal topographic priorities rather than the current practice of depending on manifest refractive or wavefront measurement alone.

I believe the process of vector planning will be the guiding technology, integrating both corneal and refractive priorities and techniques. This will address the complex issue of varying undulations of both the corneal shape and the wavefront refraction.

Clear lens extraction technologies will no doubt be thriving in increased numbers, mainly due to a larger share of an increasing population undergoing refractive surgery. Its likely strength lies at the extremes of myopic and hyperopic corrections on younger patients, where LASIK risks inducing excess aberrations or compromising corneal integrity. Implant popularity will be further increased when accommodative powers are effectively restored in the process.

In 2010 the advantages of one-step safe, clear lens removal and replacement will far outweigh the potential cataractous side effects of the intracameral lens. However, co-existing astigmatism is likely to require treatment supplemented by LASIK as a bioptics procedure, in preference to toric implants.

Should an effective intracorneal implant become available to counteract the universal process of presbyopia, then this procedure frequency might well rival that of laser vision correction for refractive error.



- **Noel A. Alpins, MD**, can be reached at 7 Chesterville Road, Cheltenham, VIC 3192, Australia; (61) 3-9584-6122; fax: (61) 3-9585-0995; e-mail: alpins@newvisionclinics.com.au.

A: Return to the surface

Peter S. Hersh, MD: In a field such as refractive surgery, which often grows by revolution, a prediction over the next decade is likely to be wrong as well as embarrassing to the prognosticator. So, let's look at what won't be the dominant refractive procedure by 2010.

First, presbyopia; maybe by 2020, but not by 2010. Although millions await a presbyopia cure, most want a physiologic cure, not an optical methodology to allow simultaneous distance and near focus. Thus, both monovision and multifocal technologies (whatever they may or will be) are inherently limited by noise or visual that is unacceptable to many patients. So these procedures will not dominate. Scleral expansion efforts promise a cure, but I

remain skeptical about the actual efficacy and long-term results, as well as patient acceptance of such a surgically complex procedure. But wait until 2020. Presbyopia will be the scene of the next revolution.

Next, phakic IOLs. Over the past 3 years, I have done corneal transplants on four eyes with phakic IOLs. Even if this is anomalous, a procedure to attract LASIK-like numbers will need to be absolutely safe, without any incidence of corneal decompensation, cataract or distorted pupils.

Although technologies are improving and many patients (especially high refractive errors) will achieve good and safe results, to dominate the landscape phakic IOLs will need to be as easy and safe for the patient as LASIK is today, and I don't think they will be by 2010.

Thus, we are left with the excimer laser. But will it be LASIK (with a microkeratome or laser flap), LASEK, PRK, custom wavefront ablation, or intrastromal ablation? As a given, I do think that some type of optical customization is likely to be de rigueur by 2010 (whether it be current wavefront concepts or otherwise). But, what will be our modality of application? I think we will leave the LASIK flap behind and return to the surface, but with the aid of new pharmaceutical agents that will allow good early vision, comfort and standardized wound healing. Such a procedure will meet the criteria of patient acceptance necessary to dominate refractive surgery: excellent visual acuity and function for a wide range of patients, rapid rehabilitation, comfort, safety and ease.



- **Peter S. Hersh, MD**, can be reached at Cornea & Laser Eye Institute, 300 Frank W. Burr Blvd., Teaneck, NJ 07666; (201) 883-0505; fax: (201) 692-9646; e-mail: phersh@vision-institute.com; Web site: www.vision-institute.com.

LASIK remains dominant

Thomas Neuhann, MD: If "dominate" simply relates to the majority in absolute numbers of procedures performed, I cannot currently see any procedure surpassing LASIK. Three main elements lead me to that assumption:

- The refractive range accessible to LASIK comprises the overwhelming majority of all refractive errors.
- The extremely high rate of success and ensuing patient satisfaction with modern LASIK in experienced hands.
- The very attractive high level of perioperative patient comfort (including bilateral surgery).

I do not see any development in IOLs, surface ablation or intracorneal inlays with the potential to make them equal or even superior to LASIK concerning range of treatable refraction, safety, exactness (including re-treatment), optical quality and patient comfort and therefore acceptance. This is accentuated by the fact that LASIK itself will likely also improve further over the years to come.



- **Thomas Neuhann, MD**, can be reached at Helene-Weber-Allee 19, D-80637 Munich, Germany; (49) 089-159-4040; fax: (49) 089-159-40555; e-mail: prof@neuhann.de.

LASIK, phakic IOLs

Vance Thompson, MD: I believe the dominant procedure in 2010 will be LASIK. Since it works so well for mild-to-moderate myopia, and the majority of myopes are in the mild-to-moderate range, I believe this procedure will be around a long time. Creating the flap with a laser, along with customized wavefront guided laser ablations, will make the public even more confident in LASIK.

I also believe that phakic IOL use in refractive surgery will grow dramatically in the next decade. Since LASIK does not work as well for high myopes and hyperopes, I believe it will need another procedure, like phakic IOLs, to round

out the refractive surgeon of the future's menu of quality services. But I see LASIK still as the most commonly performed refractive surgical procedure.



- **Vance Thompson, MD**, can be reached at Ophthalmology, Ltd., 1200 S. Euclid Ave, Suite 104, Medical Building 1, Sioux Falls, SD 57105; (605) 336-6294; fax: (605) 336-6970; e-mail: vision@vancethompson.com.

Corneal techniques, IOL procedures

Roberto Zaldivar, MD: I think that for 2010 the two dominant refractive procedures will be corneal techniques for low or moderate diopters (–6 D of myopia and astigmatism and less for hyperopia) and IOL procedures for higher diopters.

For corneal procedures, I think that LASIK and PRK will disappear and technology will allow us to use other techniques without removing the corneal epithelium or flap performance.

I really think technology will improve to allow us to perform intrastromal ablation, including all the present improvements as high-order aberrations correction.

I believe that enlarged optical zones will be our next goal, implying a major tissue removal with different ablation profile. Such advances will limit diopters to be corrected.

Concerning IOLs for myopia correction, I believe we will see an increase in phakic IOL implants in the next 5 years. It is probable that in the next few years the natural place for high refractive corrections will be the crystalline lens, supported by improvements in new IOL designs with capsular fillings and fibrosis diminishment. This new design and materials will not only be able to correct refractive errors, it will also preserve the capsule's physiological conditions, clearness and elasticity and thus preserve the accommodation. There is very promising research in new adaptable materials allowing adjustments and higher-order aberration correction.

In my opinion, intrastromal refractive procedures hold future promise for low diopters. For high refractive errors, it will be pseudophakic IOLs, with all the characteristics to achieve a precise refractive correction replacing the crystalline lens.



- **Roberto Zaldivar, MD**, can be reached at Instituto Zaldivar, Avenida Emilio Civit 685, Mendoza MZA 5500, Argentina; (54) 2-61-44-19-09-99; fax: (54) 2-61-43-80-350.