

Refractive Errors and Refractive Surgery

Introduction

Vision occurs when light rays are bent or refracted by the cornea and lens and received by the retina, the nerve layer at the back of the eye, in the form of an image, which is sent through the optic nerve to the brain. Refractive errors occur when the shape of the eye doesn't refract light properly. The main types of refractive error are myopia (nearsightedness), hyperopia (farsightedness) and astigmatism (distortion). Presbyopia (aging eye) is a problem of the lens and is characterized by the inability to bring close objects into focus.

Refractive errors can be corrected with glasses, contact lenses or refractive surgery.

Why Is It In The News?

A growing consumer demand for correction of refractive errors, and ongoing clinical findings about refractive surgery innovations, outcomes and complications continue to receive widespread interest in the media.

Facts & Statistics

- Approximately 148 million people (52% of the population) in the United States wear some form of corrective eyewear.¹
- Approximately 34 million people in the United States wear contact lenses.²
- Approximately 1.8 million refractive surgery procedures will be performed in 2002.³
- Approximately 63 million people in the United States are candidates for refractive surgery.³
- Laser in-situ keratomileusis (LASIK) accounts for approximately 95 percent of all refractive surgeries.³
- Photorefractive keratectomy (PRK) accounts for approximately five percent of refractive surgeries.³
- Other types of refractive surgery are: Intrastromal corneal ring segments (ICRS), plastic corneal inlays designed to correct low myopia and marketed under the name "Intacs;" Laser Thermal Keratoplasty (LTK), a nonincisional infrared laser treatment for correction of mild-to-moderate farsightedness; radial keratotomy (RK), a rarely used microsurgical procedure in which incisions are made in the cornea to reduce mild-to-moderate myopia; laser epithelium keratoplasty (LASEK), a variation of PRK in which the corneal surface (epithelium) is loosened and pushed to one side prior to use of the excimer laser to reshape the cornea; conductive keratoplasty (CK), the use of radio frequency waves to shrink corneal collagen for correction of low-to-moderate hyperopia; intraocular contact lens (ICL), an intraocular lens surgically inserted into the front section of the eye and placed over the eye's natural lens for correction of myopia, hyperopia, and astigmatism (currently in FDA clinical trials); scleral expansion band (SEB), crescent-shaped plastic or metal segments implanted into the white of the eye to reverse presbyopia

- (in investigational trials in Canada, Mexico, and France); laser presbyopia reversal (LPR), an infrared laser-based treatment, in clinical trials in Europe, United States, and Japan.^{4,5,6,7,8,9,10,11,12}
- The excimer laser, a device that generates cool, ultraviolet light, was first used in clinical trials for PRK in 1987 and was approved by the FDA in 1994 for use in phototherapeutic keratectomy (PTK) and in 1995 for PRK.¹³
 - The excimer laser was first used for LASIK in 1991 and was first approved for LASIK in 1998.¹³

Conclusions

Refractive surgery is intended for people who want to minimize reliance on glasses and contact lenses. It is important for patients to have realistic expectations. People looking for perfect vision without glasses or contacts run the risk of being disappointed.

However, continuing refinement and improvement of refractive surgery procedures mean that Eye M.D.s can offer more vision correction options to more people than ever before.

See additional sections on: Complications and Informed Consent; Finding and Assessing a Surgeon and Surgeon Training; Assessment of Candidates for Refractive Surgery and Glasses after Refractive Surgery; Refractive Surgery Advertising, Marketing, and Pricing.

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