

Surgical management of presbyopia includes corneal inlays; IOLs with aspheric, multifocal, or accommodative design or monovision strategies; and scleral surgery, including anterior ciliary sclerotomy and scleral expansion bands.

Keratorefractive Surgery

At present, the most widely used surgical approach to compensate for presbyopia is excimer laser photoablation to achieve the desired refractive outcome for each patient. Similar to the approach for monovision using contact lenses, the desired refractive correction can be achieved by surface ablation (PRK, LASEK, epi-LASIK) or flap procedures (LASIK, refractive lenticule extraction) and intrastromal corneal inlays. Although two corneal inlays have been approved by the FDA, the Raindrop inlay that was approved in 2015 was withdrawn from the market because of complications. The remaining inlay, Kamra, an aperture inlay approved in 2016, is available but rarely used. Corneal inlays that either enhance depth of focus or establish corneal multifocality in the setting of presbyopia remain an area of active investigation.^{351, 352} Conductive keratoplasty and laser thermokeratoplasty have been used to treat presbyopia by achieving a monovision result.³⁵³

The best candidates for monovision using these approaches are patients over 40 years old who place a high premium on maximizing their freedom from optical aids and are willing to sacrifice uncorrected distance stereoacuity to achieve this goal. Larger degrees of anisometropia produce better visual function at near, but smaller degrees of anisometropia may be better tolerated and are a viable option for some patients willing to accept a compromise.^{354, 355} Distance correction is usually performed for the dominant eye and near correction is performed for the nondominant eye.³⁵⁶ Evidence exists to suggest that near correction in the dominant eye may also be successful and even preferable in some patients.^{356, 357} Caution should be used in considering monovision in patients who have had previous strabismus surgery, phorias, or intermittent tropias, as these patients may develop postoperative diplopia. A preoperative trial with contact lenses is a useful test to determine the desired refractive endpoint for each patient based on the intended refractive outcomes.

Patients with monovision who function well for most of their daily activities may still benefit from the use of eyeglass correction, especially in dim-light conditions while driving. Many patients with a low degree of monovision will be able to drive without difficulty. Patients with monovision correction may experience a decrease in contrast sensitivity and stereopsis compared with bilateral distance correction.³⁵⁸ When the eye corrected for near vision is corrected for distance vision using eyeglasses, distance visual acuity and depth perception are optimized.

Multizone excimer photoablation to create a multifocal effect in the cornea has been explored to treat presbyopic patients with preoperative myopia or hyperopia but is not approved by the FDA.^{359, 360}

Intraocular Surgery

Lenticular surgery using a variety of IOL implants has also been used to address presbyopia. After the crystalline lens is removed, the IOL can be used to provide functional distance vision as well as near vision through monofocal, aspheric, multifocal, accommodative, extended depth of focus, and light-adjustable IOLs. There are advantages and disadvantages to each of these modalities, and the selection of the specific IOL depends on the patient's visual needs, expectations, motivation to be less dependent on eyeglasses, and willingness to accept potential compromises.

Monofocal and extended depth of focus IOLs can be used to address presbyopia by using monovision strategies. It can be difficult, however, to assess which eye is the dominant eye in a preoperative patient who has blurred vision due to cataracts. Before cataract surgery, it is also difficult to demonstrate the proposed results of monovision IOLs using contact lenses. Patients who have demonstrated success with monovision contact lenses before the development of cataracts may be well suited for this modality.

Multifocal IOLs offer additional options to provide distance, intermediate, and near vision with less dependence on eyeglasses. Multifocal IOLs achieve their effect by dividing incoming light