In the past few years, our patients have shown increased interest in undergoing presbyopia correction. Gone are the days when only middle-aged patients requested these procedures, as even our older patients who present for cataract surgery are now tempted by the appeal of spectacle independence for near vision tasks. Today, nearly 30% of our patients undergo laser- or lens-based presbyopia correction, with the chosen method of correction determined on a case-by-case basis.

PREFERENCES

Generally speaking, we prefer cornea-based presbyopia correction in younger patients who have clear lenses, low hyperopia, and low astigmatism. In all other cases, we prefer multifocal or trifocal lens implantation combined with laser-assisted cataract surgery.

We have been implanting multifocal and accommodating IOLs as presbyopia-correction strategies since 1993. Approximately 2 years ago, we participated in a European multicenter study with a trifocal IOL, and this is currently our preferred lens design. Thus far, we have seen very good visual outcomes for all distances, with fewer side effects compared with multifocal IOLs.

Among laser-based corrections, we have significant experience performing monovision LASIK, Intracor, and Supracor. We never perform monovision LASIK without a monovision contact lens trial to ensure patient tolerance.

We initially performed Intracor with the Victus femtosecond laser (Bausch + Lomb Technolas) but transitioned to Supracor (using the same laser) for several reasons. During Intracor, five concentric rings between 2 and 4 mm from the line of sight are created in the stroma. The result is a central steepening of the cornea by approximately 1.00 D, which causes a myopic shift of approximately 0.50 D and induction of negative spherical aberration. These treatments are best tolerated by patients with low hyperopia and presbyopia requiring up to 2.00 D of spectacle add, and results vary over time due to the lack of a reliable outcomes prediction method. Another problem with Intracor is the difficulty of retreatment. Lens-based options and PRK have favorable outcomes in some cases after Intracor, but LASIK retreatment is unsafe because of the risk of induced astigmatism resulting from the flap cut intersecting the intrastromal rings.

Supracor, a LASIK treatment based on the Intracor profile, is best suited for patients with presbyopia and up to 2.00 D of hyperopia. This treatment produces a trifocal pattern with zones for far, intermediate, and near distances. Visual recovery for near and intermediate distance is relatively quick, but it can take up to 1 year for far vision rehabilitation. We use Supracor only for patients with low hyperopia and presbyopia, treating the nondominant eye first. The contralateral eye is treated after vision is fully restored in the first eye. Side effects such as halos and glare are less frequent with Supracor.
than with Intracor or multifocal lenses. We have, however, noticed the same pattern of hyperopic regression seen with hyperopic laser treatments.

**TWO CASE STUDIES**

All surgeons have their share of procedures that go according to plan and those that do not. Below I present two case studies, one for a procedure that, unfortunately, did not have a favorable initial outcome and one for a procedure that did.

**Case No. 1: Supracor for hyperopia and presbyopia.**

In the beginning of our experience with Supracor, we were in the practice of treating both eyes simultaneously. Therefore, when a 54-year-old woman with 3.00 D of hyperopia and presbyopia requiring a near correction of 2.50 D in both eyes presented to our clinic, we performed bilateral Supracor. At 1-month follow-up, the patient was satisfied with her visual outcome; however, at subsequent follow-up visits she complained of deteriorating vision at all distances. On examination, we noticed a hyperopic regression of 1.75 D in one eye and 1.50 D in the other. We discussed every alternative for retreatments with the patient, including LASIK and clear lens exchange, and decided on the latter, bilaterally implanting an aberration-free IOL in order to correct the hyperopic regression. Postoperatively, the patient gained lines at all distances. Our result in this case shows that the Supracor treatment for intermediate and near can work well if it is combined with IOL implantation. However, the lesson we learned from this case is that Supracor alone is not an agreeable option for patients with presbyopia combined with more than 2.00 D of hyperopia. In these eyes, regression can be significantly greater than it is for patients with less hyperopia or myopia, and we now prefer implantation of trifocal IOLs.

**Case No. 2: Trifocal IOLs for hyperopia and presbyopia.**

Once we changed our surgical strategy for patients with hyperopia and presbyopia from Supracor to trifocal IOL implantation, we started to see more stable postoperative results in these eyes. Implanting bilateral trifocal IOLs in a 52-year-old woman with 4.00 D of hyperopia and presbyopia requiring a near add of 2.25 D in the right eye and hyperopia...
of 4.50 D with near add of 2.50 D in the left, for instance, resulted in excellent visual outcomes at all distances.

Now we prefer this procedure for all patients with a combination of hyperopia or myopia plus presbyopia because it is more predictable and produces fewer side effects compared with other correction strategies, including the glare and halos associated with earlier multifocal IOL designs.

**CONCLUSION**

Today there is no safe and effective presbyopia-correcting surgical procedure for emmetropic patients. Our experience with the use of Intracor for this indication has shown that it is able to create only a myopic shift intrastromally. Lens-based treatments for presbyopia correction are promising; however, these procedures are more invasive compared with excimer laser-based options. Applying femtosecond laser technology for cataract surgery to clear lens exchange, we believe, will boost patient acceptance in those who wear glasses only for reading. Hence, it is still of great interest to us to develop a procedure that can provide safe and effective results with a high level of patient satisfaction and an easy method of retreatment in cases with undesirable visual outcomes.

Over the years, presbyopia correction has been the biggest challenge that cataract and refractive surgeons have faced. Only procedures that produce a stable refraction over time, are safe and effective, and have few unwanted side effects can result in high satisfaction levels, not only for patients but also for the surgeon. We are still in pursuit of the perfect correction method; hopefully, it is on the horizon.

Mark Tomalla, MD, is Director of the Center of Ophthalmology Clinic for Refractive and Ophthalmosurgery, Duisburg, Germany. Dr. Tomalla states that he is a consultant to Bausch + Lomb, Bausch + Lomb Technolas, and Carl Zeiss Meditec. He may be reached at e-mail: mark.tomalla@evkln.de.

Ioannis Doulgkeridis is a resident physician at the Center of Ophthalmology Clinic for Refractive and Ophthalmosurgery, Duisburg, Germany. Mr. Doulgkeridis states that he has no financial interest in the products or companies mentioned. He may be reached at e-mail: Ioannis.doulgkeridis@evkln.de.