

Point/Counterpoint

Does Presby-LASIK Have a Role?

Two surgeons share their thoughts.

There is little data to indicate its long-term effectiveness.



By John F. Doane, MD

Presbyopic ablations with an excimer laser are not new. In fact, during my fellowship in 1995 to 1996, my mentors Luis Ruiz, MD, of Bogotá, Colombia; Stephen Slade, MD, of Houston; and Christian Hohla, PhD, then of Chiron Vision and now Bausch + Lomb, were using several software and hardware versions for presbyopic patients with hyperopia and myopia. LaserSight and Visx attempted to create excimer laser systems for this purpose.

All of the approaches, by design, induce marked amounts of higher-order aberrations to create multifocality in the hope of minimizing—if not eliminating—spectacles for any visual tasks. Surgeons attempted to apply multifocal transitional profiles similar to putting an “add” effect inferior to the visual axis and a coma profile to provide a near focal point. The two more frequently completed profiles are “peripheral” and “central” presby-LASIK. With peripheral presby-LASIK, the central aspect of the cornea creates a positive spherical aberration surface for distance vision and a negative spherical aberration surface in the midperiphery for near function. Central presby-LASIK is the opposite: it creates a negative spherical aberration surface centrally for near and a positive spherical aberration surface peripherally for distance vision.¹⁻¹¹

OH, THE IRONY

The irony of all of the aforementioned approaches is the diametrically opposed conversation surgeons have with patients (depending on their age) in which the emphasis is on dysphotopsia. In the late 1990s and early 2000s, there were jury verdicts, in some cases for several millions of dollars, due to unwanted imagery that limited patients' ability to function as they did

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Supracor LASIK provides very satisfactory depth of focus for presbyopic patients aged 40 to 55 years.



By Sheraz M. Daya, MD, FRCSEd, FRCOphth

Refractive lens exchange (RLE) with trifocal lenses, the Finevision from Physiol or AT Tri from Carl Zeiss Meditec (neither available in the United States), has for us in Europe become almost a panacea for those seeking vision correction surgery. For the early to midage presbyopic patients (aged 40 to 55 years), RLE is likely a bit aggressive, especially in myopic individuals with long axial lengths, and the risk of retinal detachment is in my view unacceptably high. Options for correcting presbyopia in younger patients include (1) monovision/blended vision, (2) intrastromal inlays, or (3) presby-LASIK.

Monovision is suitable for a small minority and requires adaptation. Intrastromal inlays, in my opinion, are still in their infancy and may well be a good additive option in the course of time. In my view, inlays are not ready for prime time.

Presby-LASIK is a natural choice for those seeking laser eye surgery. There are various offerings available using different laser platforms, each with varying outcomes reported. I am familiar with Supracor (Bausch + Lomb/Technolas Perfect Vision; not available in the United States), and I have been performing this technique on hyperopic patients for 3 years. More recently, myopic Supracor has become CE Marked and available in Europe. Supracor uses a much smaller optical zone compared with other presby-LASIK procedures, approximately 1.6 mm in diameter (Figure 1), and outcomes to date appear promising.

CLINICAL RESULTS

At the Centre for Sight in London, I reviewed a series of 58 hyperopic eyes of 32 patients treated with

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presurgery. The essential complaints in these cases were night driving limitations, glare, starbursts, and a loss of contrast sensitivity. These symptoms could be attributed to several issues such as dry eye, decentered ablations, and the induction of spherical aberration and coma. Decentered ablations tend to induce marked amounts of coma, which can be a form of irregular astigmatism. These symptoms are very hard to correct surgically and may require a rigid contact lens to be used for optimal improvement in function.

The reality is that, if a patient is not presbyopic, we surgeons do everything in our power to provide the highest quality of vision with a minimal reduction in contrast sensitivity. If we do well, patients are typically elated with their results. On the other hand, if we create roughly the same surface contours (decentered ablation) or induce higher levels of higher-order aberrations in the form of spherical aberration on presbyopic patients, we educate them that their result is ideal for them to function more independently of glasses. They may, however, have the same unwanted scotopic symptoms as the pre-presbyopic patients who sued for millions of dollars in the past.

This is unquestionably a significantly ironic situation for practitioners. There will always be patients who can tolerate dysphotopsias better than others and see the glass as half full; they minimized their use of glasses. In my experience, however, most patients will not be happy. The same can be said for multifocal contact lenses, with the majority of patients not liking the “quantity for quality” of vision trade-off, and we also see this with multifocal IOLs. There is little argument that those patients who want the highest quality of vision are better off with monovision and contact lenses or with both eyes corrected for distance and the use of readers if they are presbyopic. For patients seeking IOLs, I believe the best option is monovision or bilateral distance and spectacles for near tasks.

IMMENSE PROBLEM

What if the iatrogenic dysphotopsia of presby-LASIK did not actually occur, and patients did have an improved range of vision for distant, intermediate, and near tasks? There would still be one immense problem with presbyopic ablations. It is my firm belief that the ablations would be stable if the cornea were made of glass or plastic, but it is not. The cornea is biological tissue, and the epithelium is ever changing. In fact, if it were not for the epithelium, any corneal refractive procedure performed would be doomed to fail. The epithelium remodels after any procedure. Myopic LASIK seems to be

the least affected, whereas the double curve of hyperopic LASIK is the most. With hyperopic LASIK, regression can be significant by 3 to 5 years after surgery.

Anatomically, peripheral presby-LASIK with a peripheral trough is identical to hyperopic LASIK. Thus it seems as though it would follow the same instability of effect. Central presby-LASIK, again with significant curvature changes over the central 6-mm optical zone, may also experience significant regression. Do we have any published data to support this? We actually have very little controlled long-term data to validate the effectiveness in the peer-reviewed literature of presby-LASIK. Yet, we can infer from some reports that presby-LASIK is not stable long term with one advocate reporting, “Presby-LASIK ... is a temporary solution (mean, 5 years), which can be repeated.” Advocates believe presby-LASIK is a viable option for young presbyopes (aged 40 to 55 years).^{10,11}

CONCLUSION

It should be stated that patients aged 40 to 55 years often have significant and surprising amounts of accommodation left, so “success” in this group alone may be confounded by a placebo effect with significant downsides of dysphotopsia induction. To this author, presbyopic corneal excimer laser surgeries have had 20 years to be perfected, but there has been a paucity of data and little to no convincing data of its long-term effectiveness.

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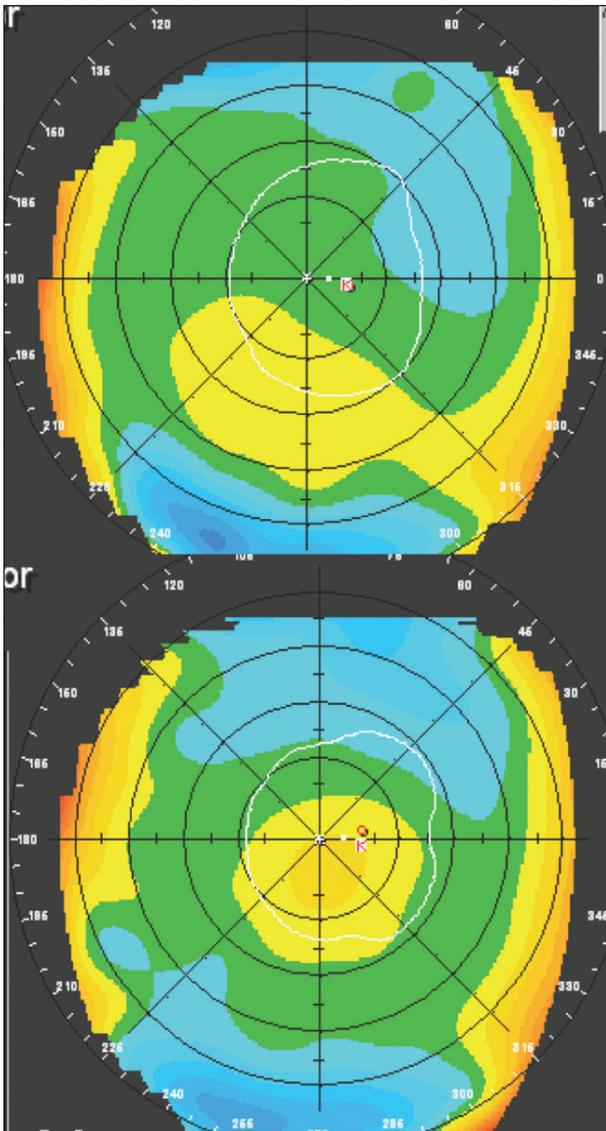


Figure 1. Central area of elevation after Supracor is visible on Orbiscan topography (Bausch + Lomb) .

Supracor. The target refraction for these patients was -0.50 D. An initial cohort of 21 patients underwent full-strength Supracor in both eyes, five patients (10 eyes) had mild-strength Supracor in the dominant eye and full strength in the nondominant eye, and six eyes were treated monocularly. Two monocular patients had previously undergone myopic LASIK at least 10 years prior and were now hyperopic, prompting our center to perform Supracor on the non-dominant eye.

The mean preoperative distance refraction was $+1.03$ D, and 12 months after treatment, the mean was -0.47 D close to the target refraction of -0.50 D. Supracor

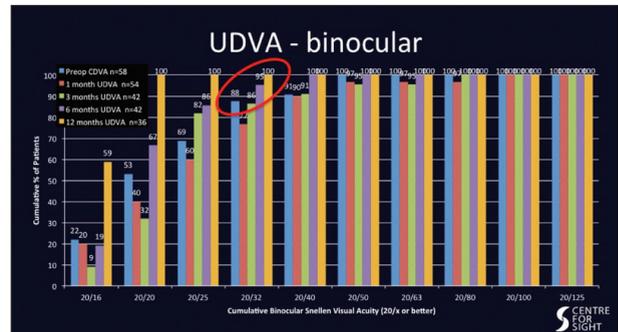


Figure 2. Uncorrected distance visual acuity.

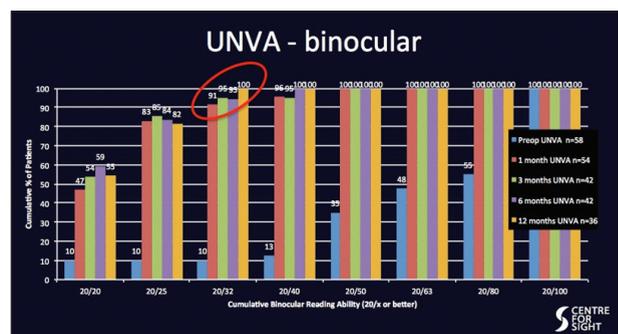


Figure 3. Uncorrected near visual acuity at 40 cm.

requires a period of adaptation for distance vision, with improvements occurring during the first year postoperative. By 1 year, all patients had achieved an uncorrected distance visual acuity of 20/20 binocularly (Figure 2), although as previously hyperopic patients with who were now slightly myopic, some indicated that their vision was not satisfactory at distance. This possibility of patients' requiring an adaptive period if they initially had poor distance vision must be explained as part of the informed consent process, and their expectations should be well managed.

Regarding predictability, there was a slight overcorrection initially, but this myopic shift ameliorated over time. Furthermore, there was a narrow standard deviation with a drift over time toward the target of -0.50 D. Near vision results were extremely good monocularly and even better binocularly, and they remained stable (Figure 3). Patients reported clear near vision in as little as 10 minutes after the procedure.

Overall, higher-order aberrations were reduced, and as would be expected with the central steepening caused by the procedure, there was a reduction in spherical aberration. There was also a statistically significant increase in trefoil.

In terms of safety, there was an initial loss of lines of vision, but this improved over time. There were no intraoperative complications; however, one patient

with previous LASIK developed epithelial ingrowth, and another patient with narrow angles required Nd:YAG laser iridotomies, after which the patients' vision improved.

CONCLUSION

Supracor is a varifocal laser corneal ablation technique that improves near focus by creating a small zone of high refractive power in the central cornea. The procedure immediately improves near vision, but some patients require a period of adaptation to achieve optimal distance vision.

Patients must be counseled individually. Hyperopic patients may have some difficulty with adaptation if they become slightly myopic in the early months after the procedure. Those who are sensitive to such changes and who have high demands for visual performance at distance may benefit more from an initial monocular Supracor treatment. Another option for these patients is a mild treatment in the dominant eye and full treatment in the nondominant one. All patients must be made aware of the time it takes for the stabilization of their distance vision. Like many options for presbyopic cor-

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rection, Supracor is an “art form” requiring appropriate patient selection, evaluation including cycloplegic refraction, and appropriate correction.

Overall, Supracor is a promising, potentially bilateral operation for patients in the early presbyopic age group for whom RLE may not be the preferred option. It is an option I regularly use on my patients. ■

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