

# Restoring near and intermediate vision with corneal excimer laser surgery

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## CASE HISTORY

Twelve years ago when I was 42 years old and tired of the inconvenience and bother of wearing glasses, I decided that I wanted to have refractive surgery to correct my -3.5 D of myopia. I underwent cornea laser refractive surgery with the predecessor to the technique that is known today as PRESBYOND Laser Blended Vision (LBV). The procedure was done by, Dan Z. Reinstein, MD, at his London Vision Clinic, London, England.

Performed then with the MEL 80 excimer laser (Carl Zeiss Meditec) and now also with the MEL 90 excimer laser, PRESBYOND LBV is a cornea refractive procedure that increases depth of field by using a non-linear aspheric ablation profile to induce a controlled amount of spherical aberration. It is designed to be combined with micro-monovision that targets the non-dominant eye for up to -1.5 D myopia. The amount of anisometropia is individualized according to the patient's age, degree of presbyopia, and tolerance. At age 42, I was not yet presbyopic, and my surgery was performed with a plano target in both eyes. Dr. Reinstein explained that because the procedure would give me increased depth of field, I could expect to maintain good reading vision for several years beyond what I normally would.

I remember it as if it was only today, I felt my heart beating hard and fast as I laid down for the surgery, but any apprehension I felt quickly disappeared. The procedure went smoothly and was done quickly, in less than 10 minutes. Within just a few hours, I was euphoric to find that I had clear vision, and on the first postoperative day, I had nearly perfect visual acuity with a slight hyperopic refraction (+0.5 D) in both eyes.

My recovery was essentially problem-free. During the first few days after surgery, I noticed tiny halos around lights, which I attribute to some corneal edema. During the first year after surgery, I used artificial tears occasionally to relieve eye dryness, particularly between cases on long surgery days or when spending a long time at the computer.

Two years after surgery, my refraction was 0.00 -0.25 X 3° OD and 0.00 -0.25 X 68° OS. Without correction, I could see 20/12.5 OU at distance, J1 at near, and read

newsprint at 20 cm. Today, at 12 years after surgery, my refraction is 0.00 -0.5 X 132° OD and 0.00 -0.5 X 65° OS, and my distance UCVA is still 20/12.5 in each eye. My uncorrected near vision has dropped to J2/J3, but I can still read J1-J2 at a distance of 40-45 cm. I am happy to report that without needing glasses I can see to bend the capsulorrhexis needle and enjoy playing tennis. I have started to use artificial tears again, but I believe that the dry eye I am experiencing is age-related and not a result of my surgery.

Although I expect that I will eventually need an enhancement as presbyopia progresses, I will wait to have the procedure until I am unable to read the newspaper without glasses. Looking ahead to the possibility of needing cataract surgery, I know I will not have to consider a presbyopia-correcting IOL because my cornea already has "enhanced depth optics".

## DISCUSSION

Patients interested in refractive surgery may have doubts about its efficacy and safety if the surgeon they are consulting is still wearing glasses. Having undergone a procedure myself, I can give a personal testimonial when I counsel potential candidates. I encourage patients to read an article that I wrote 3 years after my surgery in which I described my experience. Now, I can tell patients that the long-term results of my customized procedure are excellent and that I remain pleased with the decision I made 12 years earlier to undergo the surgery.

Today we have a number of options to offer patients who are interested in refractive surgery and presbyopia correction. There are many factors that need to be considered when determining what procedure or procedures may be appropriate for an individual. Refraction, the presence and magnitude of higher order aberrations in the cornea and crystalline lens, cornea curvature, white-to-white distance, kappa and alpha angles, and the condition of the ocular surface and fundus are all issues that I take into account.

Having said that, SMILE done on the VisuMax femtosecond laser (Carl Zeiss Meditec) is the most frequently performed corneal refractive procedure in my practice.

PRESBYOND LBV, however, accounts for approximately one-third of my corneal refractive surgeries and about 40% of all of my presbyopic patients.

Compared with its alternatives, which include refractive lens exchange with implantation of a presbyopia-correcting IOL, LASIK monovision, or PresbyLASIK that creates a multifocal cornea, PRESBYOND LBV has several advantages that made it appealing to me and that are attractive and important for many patients. Patients are already familiar with corneal laser surgery because it has been widely marketed to the public, and they tend to be less afraid of it than lens surgery that requires entering the eye and replaces their natural lens with an artificial device. In addition, PRESBYOND LBV can be offered to patients who are not good candidates for refractive lens exchange for various reasons, which can include zonular instability or macular pathology.

The low level of anisometropia used in PRESBYOND LBV is better tolerated than conventional monovision approaches and does not interfere with stereoacuity. Unlike multifocal IOLs and refractive laser procedures that create a multifocal cornea, PRESBYOND results in a continuous range of vision from near to far and maintains contrast sensitivity. Enhancement, adjustment, and even conversion back to zero anisometropia are also easy after PRESBYOND LBV.

When discussing refractive surgery options that can address presbyopia with non-cataract patients, I talk about IOL and cornea refractive procedures. When speaking about IOLs I explain the differences between trifocal and extended depth of focus (EDoF) lenses, and I use my explanation of the principle of EDoF IOLs as a segue back to PRESBYOND LBV. I tell patients that we can increase the depth of vision either at the level of the lens or in the cornea and that monovision helps to provide the full range of vision with both approaches. I believe that by understanding the similarity between PRESBYOND LBV and EDoF lenses, patients better comprehend the difference between PRESBYOND LASIK and simple monovision LASIK.

I discuss PRESBYOND LBV as an option for presbyopia correction with all patients ages 40 to 60 years who have spherical error between +2.0 and -8.0 D. In pre-presbyopic patients, I aim for full ametropic correction, and in the low myopes, I create an 8.5 mm flap that will allow a 7.0 mm treatment zone for later enhancement to address presbyopia. My PRESBYOND LBV approach in patients with presbyopia depends on their tolerance to anisometropia and aims to avoid compromising their binocular uncorrected distance vision. I target the non-dominant eye for at least -0.75 D, but

for as much myopia as possible up to -1.5 D. In my experience, about 95% of patients are able to tolerate an interocular difference of 0.75 D whereas only about 30% of patients tolerate 1.5 D of anisometropia.

## CONCLUSION

We all try to do our best for our patients and that includes providing them with accurate information that can help them make an informed decision. Because of my experience, I can say with assurance that PRESBYOND LBV surgery is a safe and effective way to help appropriately selected non-cataract presbyopic and pre-presbyopic patients who do not want to rely on reading glasses.

Patients may consult with several surgeons when exploring their options. There are some patients who have decided beforehand that they only want to have corneal laser surgery, and I believe that they will be biased towards choosing a practice where PRESBYOND LBV is available. Word of mouth from happy and satisfied patients who are enjoying excellent results after PRESBYOND LBV will do the rest for increasing practice volume.

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