REFRACTIVE EYECARE
Current Issue: November 2010 >



# Prism Lenses for Patients with Hemianopia

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Prism lenses can help hemianopes to see objects on their blind side.

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Usually the result of stroke or traumatic brain injury, homonymous hemianopia deprives patients of vision on either the left or right side in both eyes. Some patients only lose a fraction of their peripheral vision, while patients with complete hemianopia suffer a total loss of vision in the affected half of the visual field. As a result of this deficit, patients may collide with objects or people on their blind side, and many hemianopes have difficulties with mobility.

Affecting approximately 0.8% of people over age 49,[1] hemianopia is not a rare condition; when clinicians encounter it, however, they face significant challenges in helping patients deal with its effects. Because hemianopia results from a brain injury rather than a refractive error or other ocular problem, patients with hemianopia cannot have their vision "corrected" in the conventional sense. And while prism lenses have been available for a number of years, older designs provided little benefit.

With newer prism lens designs, however, many hemianopes can regain their ability to navigate their environment. I believe the best treatment option currently available is a prism lens I designed—which is manufactured by Chadwick Optical, Inc.—but other options are also available (see box).

**PRISM LENSES FOR HEMIANOPIA**

- **Benefits**
  - — Can expand the visual field by over 20 degrees
  - — Relatively inexpensive
  - — Cosmetically acceptable
  - — Double vision is limited to the periphery
- **Side effects/contraindications**
  - — Not suitable for patients with cognitive impairment
  - — Glare can bother some wearers
  - — Patients may be confused by image shifts

## Need for Better Hemianopia Correction

When I first started treating patients with hemianopia, I was skeptical (based on theoretical considerations) that prism lenses would work, so I fit the lenses according to the best available treatment guidelines, asked patients if they noticed any improvement, and then flipped the prism to the other side and asked the same question. Unfortunately, patients often gave the same (enthusiastic) response regardless of the prism position, indicating that the lenses were not actually helping (a placebo effect). I searched for better solutions for treating hemianopia; finding none, I decided to develop my own prism lens design.

*These videos illustrate how the Peli lens shifts the upper and lower portion of the image from the patient's blind side into their unimpaired field of vision. While this monocular view could be disorienting on its own, the other lens of the glasses provides an unaltered image centrally that helps to anchor the wearer spatially. Videos courtesy of Casey Suckow-Zinn, OD, and Steve Rinne, MA, of the Central Blind Rehabilitation Center, Hines VA Hospital. Produced through resources from the VA Rehabilitation Research and Development Service Grant #C3457 awarded to Joan Stelmack, OD, MPH; videos provided to Refractive Eyecare by Chadwick Optical, Inc.*

The basic idea for my lens design came from the reports in the literature that patients with congenital hemianopia often develop an eye deviation towards their blind side which helps to expand their visual field. I sought to mimic this field expansion with prisms, but I chose to limit prisms to the peripheral area of the lens so that wearers would have less difficulty with double vision. The most common version of the Chadwick Optical lens design—the 40? Horizontal Peli Lens™ (EP lens)— has two Fresnel prisms (8-mm by 22-mm) fit superiorly and inferiorly in one lens on the patient's blind side, thus giving patient field expansion in the periphery but leaving the wearer's binocular central vision unaltered (Figure 1).

**FIGURE 1 The 40Δ Horizontal Peli Lens™ has prisms above and below the patient's area of central vision.**

Using these lenses, patients can detect at least some of the objects on their blind side (up to 20 degrees into the blind side with the 40? version). Because the prisms are located only in the periphery, they do not provide a complete image of everything on the blind side, but being able to see even part of an object is sufficient to alert the patient to its presence, and the patient can then move his or her head and eyes to see the entire object clearly (Figure 2). To watch a video illustrating this image shift, go to www.refractiveeyecare.com.

## Benefits of Prism Lenses

While these lenses are not a perfect solution for every patient, we have found that they work well for the majority of hemianopes. In one multi-center study evaluating the clinical performance of the EP lenses, 74% of patients found them to be useful, and 47% were still wearing them after 1 year.[2] In addition to their efficacy, these lenses are also relatively inexpensive and cosmetically acceptable, since the prisms are smaller than those in other lenses.

**FIGURE 2 A hemianope with vision loss on the right side would not be aware of the recycling bin in this scene (top). With prism lenses, however, a portion of the image from the right side becomes visible on the left (bottom).**

As with any vision correction technology, careful patient selection will increase success rates. Because wearers must be able to interpret the visual information these lenses provide, prism lenses may not be suitable for individuals with severe cognitive impairment, and younger patients tend to adapt to these lenses more easily than older individuals. In addition, the benefit these lenses offer may be offset by side effects that some patients find unacceptable; specifically, patients may be bothered by glare from overhead lights, or they may be confused by the shifted images. Finally, complete hemianopes usually benefit more from these lenses than patients with only partial visual field loss. In the multiple studies we conducted so far, it appears that about half the patients continue to wear the prism glasses long term.

To determine whether prism lenses are a good option, clinicians should talk with each patient about his or her needs. If necessary, clinicians can also perform a trial using press-on prisms before fitting the patient with permanent prism lenses. In general, prism lenses can be prescribed for almost any patient who finds them helpful. There is, however, one exception: I avoid fitting prism lenses on very young children with hemianopia, especially those who show some eye deviation. These individuals may be able to develop abnormal retinal correspondence, which is a beneficial adaptation, if left uncorrected.

## Fitting Prism Lenses

Not just the province of low vision specialists, prism lenses can be successfully fit by

comprehensive optometrists and ophthalmologists as long as they are familiar with how these lenses work and follow the fitting instructions. Most of the information clinicians need is available in the lens fitting guide, and for clinicians who want a more hands-on learning experience, workshops supported by Chadwick Optical provide an opportunity to test the lenses on patients and gain some real-world experience.

As with any new technology, clinicians should start with simple cases before trying to tackle more complex situations. This means fitting hemianopes who do not have any eye deviation, strong eye dominance, or poor visual acuity before advancing to more challenging patients.

Finally, some patient education is required to ensure success, but this training need not be a lengthy process; I simply walk patients around the office (and up and down one flight of stairs) and demonstrate how the prisms allow them to see some of the objects on their blind side. I also give them exercises to do at home to help them internalize the fact that what they see in the prism is not located exactly where it appears.

## The Bottom Line

Hemianopia involves a partial or total loss of vision on either the left or right side in both eyes, usually as the result of stroke or head injury. While several vision correction options have been proposed to treat this condition, I believe that the prism lens design I developed (which is commercially available from Chadwick Optical) offers patients the best solution, as it provides at least a 20-degree expansion in field of vision (up to 30 degrees with the new 57? version) and has a relatively high acceptance rate. As with any vision correction option, proper patient selection and fitting experience are essential for good outcomes.

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September, 2010

Back to September 2010