

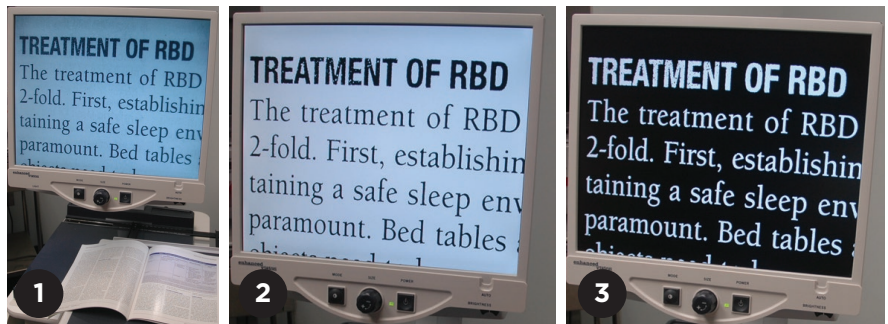
Vision Rehabilitation in Glaucoma Patients

Low vision in the United States and worldwide is a profoundly challenging condition that has implications on both an individual and societal level. Currently, 7 million Americans are living with low vision, defined as BCVA of 20/40 or worse in the better-seeing eye.¹ One million individuals with low vision are estimated to be blind, with a BCVA of 20/200 or worse in the better-seeing eye.

Glaucoma is one of the leading causes of low vision, especially among the elderly. With a global prevalence of 76 million people, glaucoma affects approximately 4 million individuals in North America.² Glaucoma impacts functional vision in several ways: by reducing VA, constricting visual fields, decreasing contrast sensitivity and dark adaptation, and increasing glare. As a result, vision impairment has a major impact on quality of life, particularly when both eyes are affected. Patients with bilateral disease are three times more likely to report difficulty with their activities of daily living compared to those without and to those with only unilateral disease.³ In addition, even mild unilateral vision loss has been associated with negative quality of life scores.⁴

Benefits of Rehabilitation

Vision rehabilitation has been shown to positively impact patients' self-reported daily tasks and quality of life, including



ELECTRONIC AIDS. (1) Desktop video magnifier. (2) Same magnifier in high-contrast mode and in (3) reverse-contrast mode. The latter is preferred by glaucoma patients with low vision.

reading, mobility, visual information processing, and visual motor skills.⁵ Nearly 50% of patients who are new to vision rehabilitation services (VRS) report a clinically meaningful improvement in visual ability and reading, emotional well-being, and functional independence after three to six months.^{5,6} However, in one study, only 14% of patients receiving VRS carried a diagnosis of glaucoma.⁷

Barriers to Rehabilitation

Barriers to vision rehabilitation occur at multiple levels.

Physicians. Many ophthalmologists report inexperience and/or unfamiliarity with guidelines on low vision.⁸ A limited understanding of the purpose and benefits of vision rehabilitation, constraints on clinic schedules and time, the chronic and gradual changes that occur with glaucoma, and limited

availability of specialists may also contribute to low referral rates.

Patients. In addition, some patients may fear the stigma of being perceived as having low vision and its associated implications. These cognitive and psychological factors may cause patients to be reluctant to pursue VRS, even when it is recommended by their physicians.

Patients with functional issues and/or difficulty obtaining transportation to their appointments are also less likely to undergo vision rehabilitation. This is especially pertinent because it may further contribute to disparities in health care. For example, patients who rely on family members to accompany them to their appointments are unlikely to complete a low vision evaluation when the family member cannot take time off work. In this way, those who have advanced disease and limited access to care at baseline become further disadvantaged because they are unable to avail themselves of services that can aid their visual function and independence.

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Rationale for Treatment

Vision impairment impacts patients' quality of life, which affects not only individuals but also their families and communities.

Quality of life. Patients with low vision may experience increased social isolation, increased depressive and anxiety disorders, decreased physical activity, and loss of independence. Medication errors because of low vision can have life-threatening consequences. Decreased contrast sensitivity can result in difficulty distinguishing steps or curbs, increasing the risk of falls and injury. Inferior visual field loss has been reported to increase the risk of falls in older patients.⁹

Difficulty with reading and trouble with driving are the most common quality of life concerns reported by patients who are undergoing evaluation for low vision.

Reading. Reading is profoundly affected by overall VA as well as the location of scotomas, which can affect a patient's reading span (e.g., the beginning or end of sentences) and limit their ability to navigate a page of text. Although reading problems are more common among those who have macular disease affecting central vision, glaucoma patients with advanced disease and paracentral or central scotomas may also have difficulty.

Driving. Driving ability is an indicator of functional independence for many patients, and they may be reluctant to bring up concerns to their ophthalmologists for fear of losing their driving privileges. On the other hand, some may prematurely stop driving. Low vision referrals and certain interventions can actually help patients safely retain their driving abilities in some cases.

Pediatric patients. In children, VRS are especially important. Maximizing visual potential is critical to reduce the risk of amblyopia, for example. And vision rehabilitation can positively impact school-age children's academic performance and reduce gaps in educational achievement. Necessary accommodations for children, such as individualized education programs, should be coordinated with schools.

Vision Rehabilitation Model

The Academy's *Vision Rehabilitation Preferred Practice Pattern* outlines a comprehensive, three-level model of vision rehabilitation.¹⁰

Level 1 is a foundation that depends on ophthalmologists to recognize patients with low vision (those with BCVA of less than 20/40, visual field loss [central or peripheral], or decreased contrast sensitivity). The subsequent response should involve education, counseling, and/or referral to VRS. The NEI VFQ-9, an abbreviated version of the 25-item National Eye Institute Vision Function Questionnaire, can be administered to patients in the office to help identify the need for services.

Level 2 involves services provided by clinicians who specialize in vision rehabilitation.

Level 3 involves a multidisciplinary team that may include other professionals, including occupational therapists, social workers or psychologists, and orientation and mobility trainers, among others.

Evaluation of Low Vision

VA, visual field, and contrast sensitivity testing are the main components of a low vision evaluation. Perhaps the most important assessment is to determine the impact of decreased visual function on a patient's daily activities, which can guide recommendations for management and strategies to maximize their remaining vision.

Interventions

Optical devices. From spectacles to magnifiers and telescopes, optical devices are a logical place to start with rehabilitation.

Spectacles. Higher add power in glasses and high-plus reading glasses provide magnification and are a standard basic intervention for patients presenting with low vision and reading difficulties. The Kestenbaum rule provides a quick estimate for the required add by taking the inverse of the VA (i.e., vision of 20/200 would require 200/20 = 10 D of add). However, it does not factor in the effects of scotomas or decreased contrast sensitivity. Moreover,

reading glasses with higher powers require base in prisms to compensate for convergence at near. The advantages of glasses include hands-free magnification and large field of vision.

Magnifiers. Other tools include handheld or stand magnifiers, which can come with or without their own source of illumination. Handheld magnifiers are easier to use for temporary reading (e.g., looking at a menu), while stands are useful for patients with tremors or those who are reading or performing near work for prolonged periods of time.

Microscopes and telescopes. Telemicroscopes or loupes provide high magnification at a greater working distance than reading glasses but are limited by the depth and range of visual field. Telescopes for distance vision (e.g., seeing signs or faces) can be handheld or attached to glasses (a bioptic telescope) and may have either a binocular or monocular design. Those that are full diameter can be used while stationary for distance activities, such as watching shows or sports. For patients with severe peripheral field loss but good central VA, high minus lenses and reverse telescopes actually minify the image, allowing for more information to be visualized in a small visual field, but with less acuity.

Electronic devices. Technology provides low vision users with numerous interventions, from visual and auditory aids to social assistance.

Magnifiers. Similar to traditional magnifiers, electronic magnifiers (Fig. 1) and smart devices can provide (often adjustable) magnification and contrast, but without the peripheral distortion that occurs with glass lenses. Reading material is placed below the magnifier, which displays the text on a monitor and allows for further modifications.

Auditory tools. Technology for text to speech conversion (optical character recognition) and other types of sensory substitution, such as voice commands and output (e.g., talking clocks and other devices), can be helpful.

Social support. Smartphone apps that connect sighted volunteers with visually impaired individuals provide additional support and versatility in the

types of tasks that can be completed.

Nonoptical aids. Direct task lighting (e.g., goose-neck lamps), tactile feedback (e.g., felt-tipped rather than ball-point pens), large-print and high-contrast reading material, and typoscopes are additional modifications that may help patients. A typoscope is a simple, inexpensive card that allows the patient to focus on one line at a time while reading because it filters out excess information and reduces glare.

Occupational therapy interventions such as reducing tripping hazards at home, marking steps and objects with high contrast tape, and using head and eye scanning strategies to become more aware of the environment are equally important, especially for mobility. While some patients may be reluctant to use a long white cane, it aids in walking by improving obstacle detection and avoidance and signaling to others that the user is visually impaired.

Normalize low vision tools. Recommendations for many of these interventions can be made even prior to a low vision referral or evaluation. For example, offering handheld magnifiers at the front desk when patients check in can facilitate their ability to fill out forms independently. Having examples of tools such as typoscopes in the office can demystify these interventions for patients and normalize their use. When time constraints limit discussion, a handout can provide valuable information to patients. (See aao.org/low-vision-and-vision-rehab and scroll to “handout.”)

Conclusion

Glaucoma—with its treatment burden, risk of progression, and associated irreversible vision loss—is a difficult disease to manage for both physicians and patients. While tracking objective measures such as nerve fiber layer thickness, IOP, and visual field changes are undoubtedly critical in the care of glaucoma patients, physicians should be mindful of the functional impact this disease has on patients. Education and counseling on low vision, support groups, and other social services are equally important to consider. Approaching low vision in glaucoma

patients as a multidisciplinary effort may have a tremendous impact on their quality of life.

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