Current Options in Low Vision Rehabilitation

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Low vision can result from loss of macular function, with loss of peripheral vision or from loss of hemi-fields of vision such as in cases with stroke. Low vision rehabilitation (LVR) is the continuation of care after all other means for restoration of vision were used and failed. Modern LVR is a multidisciplinary endeavour responsible for providing assessment, prescribing devices, and conducting training sessions for individuals with low vision. Ontario recognizes the diverse needs of individuals requiring LVR interventions, covers LVR assessments and LVR training sessions, and provides financial subsidies for the purchase of low vision devices.

Key words: low vision rehabilitation, low vision, age-related macular degeneration, assistive devices, vision therapy

Introduction

Vision loss is one of the most common conditions affecting older adults. It not only reduces their ability to cope with daily living activities, but also it affects the safety and quality of life of the individuals. In many cases, vision disability is overlooked by older adults and their caregivers in favour of urgently needed care for chronic pain or cardiovascular and musculoskeletal disorders. Low vision is vision not acceptable to the patient or to the significant other. It can result from loss of macular function such as in age-related macular degeneration, or because of loss of peripheral vision as in retinitis pigmentosa or endstage glaucoma, or from loss of hemi-fields of vision, such as in cases with stroke.

Compounding the issue is a lack of awareness among the public as well as among caregivers and health care practitioners of available therapies and resources to promote low vision rehabilitation (LVR)—despite the fact that Ontario has one of the most advanced and comprehensive LVR programs in the world. The Ontario Health Insurance Plan recognizes the diverse needs of individuals requiring LVR interventions and covers LVR assessment and training sessions. Together with the Assistive Device Program (ADP) of the Ontario Ministry of Health and Long-Term Care, which provides financial subsidies for the purchase of low vision devices, it puts Ontario in the enviable position of being the only province in Canada and the only jurisdiction in North America to have comprehensive publicly funded LVR services for its residents.1

Modern LVR offers real, significant, proven, and much appreciated help for all persons with vision impairment. It is a multidisciplinary endeavour of professionals with a specialty in LVR who are responsible for providing assessment, prescribing devices, and conducting training and therapy sessions for individuals with low vision.2 Within the framework of this model, ophthalmologists and optometrists serve as the low vision specialists, performing the initial low vision assessment (LVA) and many other LVR services. Opticians and others serve as providers and dispensers of low vision devices prescribed by the ophthalmologist and the optometrist. Occupational therapists and a variety of low vision trainers, teachers, and educators provide one-on-one training for rehabilitation of visual functions and functional vision. A primary care practitioner should suspect low vision when witnessing loss of visual acuity, loss of central or peripheral fields of vision or ocular motor dysfunction.

It is estimated that there are about 10 ophthalmologists, 60 optometrists, and 2,000 other vision rehabilitation trainers and teachers across Canada providing LVR services. Ophthalmologists and optometrists mostly provide LVR services from their offices or from university-based clinics. Most major universities in Canada have established LVR clinics within their Department of Ophthalmology or Optometry. The Canadian National Institute for the Blind (CNIB) along with other nonprofit institutions across Canada, such as Institut Nazareth et Louis-Braille, the Montreal Association for the Blind, the Retinitis Pigmentosa Foundation, and AMD Alliance, provide a variety of services and support to patients with low vision. Such services include counselling and referral, orientation and mobility training, rehabilitation teaching, sight enhancement services, technical aids programs, library services, and career development and employment services. These groups also serve as a first station where referrals for formal LVAs are made to ophthalmologists and optometrists specializing in low vision.

Low Vision Assessment

Low vision assessment (Table 1 and Figure 1) endeavours to document and quantify residual visual functions and residual functional vision, to identify priority tasks for rehabilitation, and to devise vision rehabilitation plans tailored for the individual. A formal LVA is highly specialized and requires specific skills and sophisticated equipment and devices. It involves the assessment of residual visual acuity in black and white or in colour, with special attention to determining potential visual acuity.
as targets for rehabilitation goals. In clinical research today, there is almost universal use of the Early Treatment for Diabetic Retinopathy Study chart (Figure 2). This chart is also the current accepted standard in clinical low vision practice for assessment of residual visual acuity levels.

A new test developed in our clinics can more accurately detect residual visual acuity in patients with low vision who have age-related macular degeneration. The test estimates potential visual acuity (PVA) under optimal viewing conditions and goes beyond the abilities of standard acuity tests currently in use in patients with low vision. The PVA charts are used routinely in LVA performed in our low vision clinic and help set targets for vision rehabilitation.

Special attention is aimed at assessing contrast sensitivity (CS) and the ability to perform various tasks at different levels of contrast. The spatial resolution ability of the visual system, commonly known as visual acuity, does not predict an individual’s ability to detect objects of a certain size. Vision research recently demonstrated that the capacity to detect and identify spatial form varies as a function of spatial resolution ability as well as concomitant contrast detection ability. Contrast sensitivity refers to the ability of the visual system to distinguish between an object and its background and represents the lowest contrast level that can be detected by a patient for a given size target against a given background. Measurements of the CS function enable us to assess PVA at the lowest level of contrast difference. Testing charts can be designed to display one or many spatial frequencies at various levels of contrast. There are several commercially available clinical tests that measure CS. The most commonly used are the Vision Contrast Test System (VCTS) and Pelli-Robson charts. The VCTS charts have the advantage over the Pelli-Robson letter charts in that they can measure CS at several individual spatial frequencies; therefore, they are used routinely in our clinic and research work.

Testing and assessing residual oculomotor efficiency is becoming more important as the understanding of LVR broadens, and these are performed in most LVAs. Special attention is devoted to assessing the impact of glare, photostress, and phototoxicity on eyes with low vision. Finally, at the core of LVR is the assessment of preferred retinal loci (PRLs), the pseudo-foveae developing naturally in most individuals after vision loss. The identification of the eccentric location of the PRLs in patients with low vision is the core component of any modern LVA, and positive results offer the LVR practitioner the option to use, for rehabilitation, the best residual visual function available. Development of PRLs occurs naturally, in most cases when macular visual function is lost. Such a PRL can develop on any part of the residual retina, can be single or multiple, is apparently related to performance of specific tasks, offers superior visual function unmatched by any other locus on the retina, and has the additional benefit of functional improvement with training.

Detection and characterization of PRLs has a long track record—in the laboratory environment, by the use of scanning laser ophthalmoscopy, and in clinical practice, through a variety of practical clinical methods. These clinical methods include observing eye movements, noting the Hirschberg corneal

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<td><strong>Low Vision Assessment</strong></td>
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<td><strong>Intake</strong></td>
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Source: Adapted from Markowitz S., 2006.
light reflex as an indication of eccentric viewing, checking for scotoma displacement as an indicator for PRL location, and employing modified visuoscopy methods using direct ophthalmoscopes, the clock face technique (which requires the identification of eccentric targets), scanning prisms, macular photography with fixation targets and sophisticated instruments such as the Optical Coherence Tomography and the Nidek MP-1 microperimeter.10

**Low Vision Devices and Rehabilitation Therapy**
Prescribing devices and vision rehabilitation therapy to improve visual functions has a long-standing tradition in many cultures across the span of many centuries.11 Currently, the purpose of an LVA is to provide recommendations for interventions that will lead to the restoration of quality of life. Many methods to improve residual visual functions have evolved over time, but one must consider the most adequate method when choosing and prescribing an optical device for a selected task. The methodology used for enhancement of residual visual functions also suggests the type of device best suited for the task at hand. The traditional and well-known method of magnification is still used widely across the world; in most cases, it is the only method considered for rehabilitation. Less known but equally effective methods are available today for introduction in clinical practice with little or no effort or cost. Image relocation with prisms to PRL (Figure 4), field displacement to primary gaze position, field expansion, and manipulation of light methods are currently practised in addition to or instead of the magnification method. Methods for improv-
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Key Points

- Low vision is prevalent in the community in growing numbers.
- Primary care physicians have a duty to identify low vision, provide care, or refer patients to specialists.
- Low vision rehabilitation is the continuation of care after medical and surgical interventions have failed.
- Modern low vision rehabilitation can restore functional vision in most cases and improve quality of life.
- In Ontario, low vision rehabilitation is covered by provincial health care programs.

ing residual visual functions may impact on one or a few residual visual functions—therefore, one must be familiar with the benefits and limitations of each method used.

A sequential approach is recommended when using the various methods available for prescribing devices to improve residual visual functions. One should start with the correction of refractive errors, taking notice of eye dominance. This is followed by the stabilization of oculomotor functions, with image relocation and the prescription of the best lighting conditions to reduce glare and improve contrast. The final step is the prescription of adequate magnification and field restitution devices.

Conclusion

Vision rehabilitation is emerging as a new frontier in ophthalmology and a new subspecialty of interest to many. Resources providing information, help, and service to the public, patients, and various professionals are emerging at an accelerated pace on the Internet (e.g., see the faculty page of Dr. Samuel Markowitz) in professional publications, and through various other media outlets, reflecting an increase in demand for services. The population demographics are such that a tidal wave of low vision patients will soon present to our offices. It is worth noting that a recent study from the American Academy of Ophthalmology highlighted the fact that LVR is one of the fastest-growing segments of ophthalmology office practice. Hence, we family physicians, optometrists, and ophthalmologists will sooner or later have to address the vision rehabilitation needs of our own patients with low vision, whether through a referral note to an LVR practitioner or by providing vision rehabilitation interventions.

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References


Clinical Pearls

- Most people with low vision can achieve normal size print reading abilities with usage of preferred retinal loci and high magnification glasses.
- Most stroke patients require low vision rehabilitation either for improvement of visual acuity or for field expansion.