LOW VISION DEVICES

A low vision device (LVD) is any device which enables the patient to improve visual performance. Many people confuse low vision optical device with standard eye glasses. There is a difference – LVDs provide magnification while standard glasses only focus the image for the eye and in some patients provide a weak/smaller magnification. By using magnification, some distortion may remain but the image is enlarged, making it easier to see.

Low Vision devices are the tools of trade in Low Vision Care. These devices help the low vision patients to attain functional vision for the practical purposes like reading & writing.

Besides using an optical device to magnify or enlarge the retinal image, actually bringing an object closer or enlarging the print can be a great help to those who are visually impaired.

Categories of low vision devices
1. Optical devices 2. Non-optical devices

TELESCOPIES

Distance vision telescopes are the only optical device that assist low vision person with distance tasks if conventional glasses are unsuccessful. These devices utilizes angular magnification. The user should wear his own prescribed glasses the field of view will be larger when it is held close to the eye. They are available as hand held and spectacle mounted. Hand held telescopes are designed for monocular use and are available in powers of 3x, 4x, 6x, and 8x magnification whereas binocular spectacle mounted telescopes are available in powers of 3x magnification. The telescopes could be used for the following distance vision tasks.
a) Are useful for specific tasks requiring magnification at variable distances. Like reading chalkboard in the school and recognising faces at some distance. b) Spot distance viewing for example, signs like seeing bus numbers and street signs to enhance independent travel and to watch television and sports event. c) Can be mounted in spectacle to leave hands free if necessary and an improvement could be a reading device/telemicroscope by incorporating a reading cap into its front lens.
There are certain disadvantages using telescopic devices mainly as it is not readily accepted because of cosmetic reasons, further the field of view is reduced, disruption of spatial judgement, as the objects appear closer, needs instructional training program (localization, fixation, scanning and tracking).

OPTICAL DEVICES FOR NEAR VISION TASKS

Magnification is determined by assessing the acuity level needed to perform a desired task and relating it to the best corrected acuity achieved with conventional lenses.

\[
\text{Mag} = \frac{\text{Required V.A for task}}{\text{Patient V.A}}
\]

SPECTACLE MAGNIFIERS

The spectacle magnifiers are available in powers ranging from +4.5D to +24.00D. The ordinary spherical lenses causes distortion of the image due to the peripheral aberrations and hence cannot be used in powers more than 10.00D, whereas lenticular design lenses which has no power in the periphery of the lens has less peripheral abrasions and can be prescribed in powers upto +24.00D, and these lenses are available in India. The aspheric lenticular lenses provides totally distortion free image as they have aspheric surface in the periphery which cuts off all the light rays passing through the periphery of the lens and can be prescribed in powers of more upto +40.00 D. which could not be possible with the ordinary spherical lenticular lenses. The manufacturing of aspheric lenses requires a very sophisticated technology which is not existing currently in India.

Uses of spectacle magnifiers are 1) Long-term reading, 2) Writing tasks, 3) Needle work 4) Invoices, receipts etc.,

Advantages
1. “Psychologically” acceptable
2. Useful for prolonged reading
3. Provide widest field of view
4. Make binocular vision possible if base-in prisms are included in the +5 to +10 range; prism half-eye glasses are readily available commercially, inexpensive, and easy to demonstrate.
5. Free hands for tasks requiring manual manipulation

Disadvantages
1. Require closer working distances, which may obstruct illumination and make writing difficult if lens power is stronger than +10D
2. Are inconvenient (need to change glasses) for spot reading tasks, in which information is gained from single words or short phrases (for example, price tags)
3. Difficult to use for patients with eccentric viewing with eye/head turns. (working distance is fixed, optical centre is fixed)
**HAND & STAND MAGNIFIERS**

Magnifiers are available in powers ranging from +10.00D. to +32.00D. (2.5x, 3x, 6x & 8x). Magnifiers could be either hand held or stand mounted and are designed to help low vision patients with short-term spotting tasks. Both the hand-held and the stand-mounted magnifier could be self-illuminated for better contrast.

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**HAND HELD MAGNIFIERS**

**Uses**

The typical use of magnifiers are:

1. Reading newspaper and books for short time
2. Checking labels and prices while shopping
3. To read dials, gauges and measuring tapes in vocational setting
4. To check mail, phone number and addresses
5. It can also be used as an training aid in patients who resist the close working distance of spectacle device

**Advantages**

1. Are generally inexpensive and readily available in the market
2. Can be used for reading at more customary distances in low-power range.
3. Have low patient resistance (familiar device)
4. Are handy for spot reading tasks, in which information is gained from single words or short phrases (for example price tags)
5. Are portable
6. Are usable with patient’s spectacle correction (this is important if the patient has a strong cylinder)

**Disadvantages**

1. Must be held with one hand (possibly both hands)
2. Are slow and uncomfortable for prolonged reading (1) hand and arm fatigue occur with extended use (2) reduced field of view slows reading
3. Must be held at correct focal distance to obtain maximum power
4. Are less effective for patients with limited dexterity or hand tremors
5. Provide limited field of view compared to spectacles
6. Are somewhat less effective than the same power in a spectacle frame

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**STAND MAGNIFIERS**

Most stand magnifiers are designed for use with a standard bifocal add or reading glasses.

**Advantages**

1. Handy optical devices as the focal distance is stable
2. Are suitable for patients with hand tremors
3. This device is especially useful to the persons who have difficulty in finding or maintaining the correct distance when using spectacles/hand magnifiers
4. Are useful for patients with constricted visual field when held at arm's length
5. Are available with built-in light source, which can be highly effective in enhancing contrast

**Disadvantages**

1. Are inconvenient to carry
2. Are awkward to use on non-flat surfaces (requires the use of a reading stand)
3. Have small field of view
4. Cause excess shading and reduce lighting onto surface (unless self-illuminated)
5. Impossible to write with most designs
6. May result in poor posture after prolonged use, unless a reading stand is used
CLOSED CIRCUIT TELEVISION (CCTV)

Closed circuit television is an electron optic, new treatment option for reading and writing tasks in patients with very low vision. CCTV provides higher level of magnification than the spectacle and hand stand magnifiers (from 20x to 30x magnification).

The CCTV system has many advantages
1) Convert any material to large print instantly
2) Are the only devices that allow binocularity at high levels of magnification
3) Enable writing (for example, writing checks, doing crossword puzzles)
4) Provide wider field of view for level of magnification that do standard magnifiers.
5) Allow sufficient reading speed to make continuous text meaningful at high levels of magnification
6) Can be easily adjusted for material of different sizes or for fluctuations in vision
7) Provide high illumination and contrast enhancement

The CCTV option is however expensive and generally not portable

Source: Vision Rehabilitation Services, LVPEI

COMBATING POPULAR MYTHS

⇒ Holding print closer to the eye is harmful.
⇒ Sustained use of the eye for reading is itself damaging to sight.
⇒ Reading ability is correlated with visual acuity, binocular fusion and depth perception
⇒ Low vision child may progress to blindness, braille should be taught for that eventuality.
⇒ Use of LVDs (Optical) is harmful.
⇒ Low vision patients may progress to further visual loss if TV is watched from close distance.
⇒ Children with poor vision automatically need glass or LVDs.

(Eleanor E. Faye, M.D. Clinical Low Vision, Little Brown and Company, Boston, USA 1976)
ESSENTIALS OF TRAINING PATIENTS IN THE USE OF LOW VISION DEVICES

Training constitutes the most important aspect of low vision care because using low vision devices is not the same as using conventional spectacles. The importance of training a patient to efficiently use the low vision device prior to final dispensing cannot be overemphasized. There are certain important aspects to be borne in mind while training a low vision patient and they are as follows:

- The device(s) must allow the patient to do the task he/she wants to do.
- The patient must be able to appreciate the advantages of accepting a given device rather than look at its disadvantages.
- Encouragement should be provided to the patient.
- A success-oriented training program must be provided to enhance acceptance of device(s) i.e. the practitioner must define success in terms of particular objectives. This would avoid future misunderstandings and frustration.
- Written instructions in use of device(s) should be provided to reinforce the verbal instructions the patient has received.
- The practitioner must be able to explain "how the device(s) works" in a terminology with which the patient is familiar.
- Myths/misbeliefs with regard to use of residual vision must be dispelled. This would enable reduce resistance to use of the device(s).
- The tasks should be broken into component parts. The key here is to start with the easiest task first and then after it is mastered to move onto the next level of difficulty.
- First few training sessions should be conducted under professional supervision and should be provided for short period of time. If patients complain of a discomfort, it is essential to reassure them about it and provide a "break" before starting the subsequent sessions of training.
- The training program cannot be generalised to all low vision patients; rather it should be tailored to the patient's needs.

- The practitioner should be flexible with regard to the patient's needs and training sessions.
- Last, but not the least, do not feel discouraged if the patient does not want to use a particular device after successful training. It may be that once the patient has been exposed to the many advantages of low vision devices, they would return later for your help.

A flexible, yet planned, training program will enhance the chances of success with low vision devices and should be made an integral part of all low vision care. Such an endeavor would lead to successful low vision rehabilitation.

Source: Vision Rehabilitation Services, LVPEI

NEW TECHNOLOGY TO ENHANCE VISION

"This new device allows people with severely impaired vision to use their remaining vision effectively and become more independent". Called NuVision, the device combines magnification and image enhancement in a personal display using two small LCD screens positioned directly in front of a patient's eyes. The device is small, lightweight, and easily fits over glasses. The optical system can focus from six inches to optical infinity, enlarges up to 20x magnification and allows users to switch between color and black and white for contrast. The device is simple to use and can be plugged into an electrical outlet or used with a lightweight lithium battery for portability. Additional options include connecting it to a computer for work or additional ability to view TV programs or DVD with a simple adjustment. To read, patients use the built-in optics or plug in a hand-held scanner.

A realistic solution for persons who have a wide range of eye disorders, including macular degeneration, diabetic retinopathy, glaucoma, optic atrophy, albinism and other conditions.

Source: http://www.newscom.com/cgi-bin/prnh/20000407/ALLINAH-logo
SIGNIFICANT ROLE AND RESPONSIBILITY OF PARENTS OF VISUALLY IMPAIRED CHILDREN

L.V. Prasad Eye Institute is a tertiary eye hospital, also provides Vision Rehabilitation Services for Blind and Visually Impaired. It was realised that a level of visual disability could have been reduced and can avoid secondary handicap in children with visual impairment, if there been an early intervention program available with parental involvement.

In this concern parental training was formulated. In Vision Rehabilitation Center 71 parents of visually impaired children underwent parental training from March 1995 to August 1999. Mothers (n=43), Fathers (n=14) underwent training, in some cases both of them (n=14) received training. Parent who had visually impaired children below the age of five received this training. The aim of the training is to make parents to understand their children's visual disability and adapting traditional methods of child rearing. Also to make the parents to participate in both planning and implementation of rehabilitation services for their children. This training program includes periodical parent meet, workshop for parent and siblings. Summer camp for Visually Impaired children along with their families.

Depending upon the child need, curriculum was designed. Initial part of the training program and important instructions given directly to the parent for a short period. Remaining instructions was given through correspondence to the parents (n=55).

Parents met professionals with the regular time interval to give feedback and to get instructions. Parents (n=16) received training through regular classes. In our case some of the parents play a dual role - parent cum professional. We found that those parents with minimum school level of education and middle class economic background, learn sufficient skills to bring up their children. Parents overcome their isolation and develop a group spirit.

By adapting this approach, we have been able to reach children who are distant located and we have able to accommodate a large number of children.

Also it made economic sense to our center as well as the families involvement. Visually impaired children benefited in the natural environment, which would not have been possible without parent involvement.

Source: Vision Rehabilitation Services, LVPEI

You can help the Vision Rehabilitation Center of the L.V. Prasad Eye Institute discover basic causes and treatment strategies for eye disease through research, restore vision to an indigent patient and help expand the frontiers of ophthalmology through your tax deductible contribution to the Hyderabad Eye Institute or the Hyderabad Eye Research Foundation.

(Donations above Rs. 250/- are exempted under Section 80G of Income Tax Act, 1961 for Hyderabad Eye Institute and 35(i) (ii) for Hyderabad Eye Research Foundation).

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