

Aural Rehabilitation Strategies for the Visually and Hearing Impaired Patient

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Government surveys indicate that 2.7 million Americans suffer dual vision and hearing handicaps. The largest proportion are the deaf:vision-impaired, followed then by the vision-impaired:hearing-impaired, the blind:hearing-impaired and the deaf:blind (Hicks & Pfau, 1979). The importance of auditory skills to a visually handicapped person is well documented and the study of hearing is included in the training curriculum of many professionals who work with the blind. In comparison, few hearing-health professionals have adequate knowledge of abnormal vision. Most of us are poorly informed about eye pathologies and their functional consequences, although adequate sight is required for speechreading and interpretation of sign language. Visual impairment is also known to adversely affect a patient's adjustment to the use of a hearing aid. The purpose of this article is to provide the reader with information about functional consequences of specific eye conditions and to suggest modifications in aural rehabilitation techniques necessitated by abnormal visual functioning.

Loss of vision is our most feared chronic affliction even though it is not as widespread as hearing impairment. According to a 1980 report of the National Society for the Prevention of Blindness, 11.5 million Americans have some degree of irreversible vision impairment. Only 500,000 of those are classified as legally blind, but a much higher proportion are unable to see well enough to read ordinary newsprint. Approximately 100,000 people in the United States have no useful vision at all.

LEGAL BLINDNESS

An individual is considered legally blind if either visual acuity or peripheral field vision is worse than the following specified limits. Visual acuity, the ability to see and identify objects at a distance, can be no better

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than 20/200 in the better eye with the use of corrective lenses. In other words, the legally blind person may only distinguish at a distance of 20 feet what a normal eye is able to see from 200 feet away. This amount of vision allows a person to travel adequately without the assistance of a cane, guide dog, or sighted guide, but severely affects the ability to read print, speech-read, and see the parts of a hearing aid. An equally important parameter of visual functioning is the size of the patient's peripheral visual field. Normal bilateral field vision measures 180°. If a patient has peripheral vision of less than 20° s/he may be classified as legally blind. Patients with constricted peripheral fields (also known as tunnel vision) often have adequate central visual acuity which allows them to see print and other fine detail, but they have difficulty traveling safely around their environment because of an inability to see obstacles not directly in their path.

VISUAL IMPAIRMENT

The overall functioning of a hearing handicapped patient is significantly affected by poor vision. Because some visual impairments are not obvious to the observer, the audiologist is advised to ask each patient about visual functioning when a case history is taken. Questions contained in Appendix A will help determine a patient's visual capabilities. In addition, the audiologist can utilize the Snellen Chart to test visual acuity.¹

Of all the causes for impaired vision, those resulting from refractive errors are the most widespread in our society. They occur when the structures of the eye which bend light (cornea and lens) onto the retina are not a normal shape. Since such errors can be reversed with corrective lenses, people with refractive errors are not at issue in this article. It is the 11.5 million Americans whose vision cannot be fully restored with lenses or medical intervention to whom attention is given here.

Individuals with irreversible visual impairments who still retain a significant amount of usable sight are known as "low vision" patients. In a sense, low vision is analogous to sensori-neural hearing loss since neither can be cured or restored completely to normal function. Although they are handicapped by their visual impairment, not all low vision patients are legally blind since their sight may not be equal to or worse than the specified limits of 20/200 acuity or 20° peripheral field vision.

Visual impairment does not always imply severe handicap. Over 90% of the low vision population retain a good deal of usable sight. The remaining 6 to 10%, however, are severely impaired and require the assistance of guide dogs, canes, or sighted guides for traveling purposes. With no appreciable amount of useful vision, they are dependent on tactile cues and audition for

¹ *Editor's Note:* For a discussion on the use of the Snellen Chart for assessing far visual acuity of hearing-impaired persons, see D. Johnson and F. Caccamise, "Hearing-impaired students: Options for far visual acuity screening," *American Annals of the Deaf*, 1983, 128, 402-406.

orientation and learning tasks.

CENTRAL FIELD VS. PERIPHERAL FIELD DEFECTS

The most common cases of non-refractive low vision impairments (those not fully reversible with corrective lenses) treated in a general ophthalmologic practice involve conditions which affect *central visual acuity*, the ability to clearly distinguish stimuli which are directly in our path of vision. Central field defects can result in overall blurry vision such as that experienced by people with cataracts. Other pathologies, like macular degeneration, affect central acuity by resulting in a gray or blurry spot known as a scotoma. These patchy spots can effectively block out discrete portions of a visual image. When central vision becomes impaired, a person has immediate awareness because the capacity to see fine detail is affected. Such a disability has consequences for many activities of daily living which are dependent on the ability to read print, thread a needle, work at a job involving small objects, see the temperature settings on an oven, or identify the prices of foods on the labels of items at supermarkets. Most people with central visual dysfunction are over age 60. Treatment of this condition generally involves the prescription of special lenses and magnifiers.

A potentially more disabling type of vision problem is that resulting in *constricted peripheral fields*. This dysfunction interferes with the ability to see obstacles which are not in the direct line of sight, a drastic consequence relative to the ease with which people are able to move around the environment independently. This type of visual field defect may develop so insidiously that individuals are unaware of its existence until the advanced stages. People with constricted peripheral fields find themselves tripping over obstacles and bumping into obstructions which are no longer visible. It is often assumed that other people are placing obstacles where they cannot be seen. It is not until many accidents are sustained that these persons may seek help from an eye specialist. A number of pathologies which cause peripheral field loss eventually affect central vision as well, thereby leading to blindness. Some of the more common etiologies resulting in peripheral field loss are glaucoma, retinitis pigmentosa, and optic nerve atrophy.

EYE PATHOLOGY AND TREATMENT

Causes of visual disorders are numerous. Table 1 provides brief descriptions for some of the more familiar and prevalent etiologies of visual disorders and their recommended treatments.

In addition to conditions which cause visual dysfunction in isolation, there are numbers of systemic conditions which result in both vision and hearing impairment. Table 2 lists the more common of these conditions.

The interested reader can investigate several references which are listed in Appendix B of this article for more detailed information concerning the

Table 1
Eye Pathologies Resulting in Low Vision

Eye Pathology	Etiology	Visual Dysfunction	Usual Age of Onset	Medical Treatment	Cure
Cataracts	numerous theories exist	cloudy vision due to opacity of crystalline lens of eye	usually occurs in aging eyes but can be 2° to retinitis pigmentosa & congenital rubella	surgery and lens replacement	usually good surgical success
Glaucoma (open angle)	increased intra-ocular fluid pressure	peripheral field loss leading to blindness if untreated	usually after 40 years of age	eye drops; laser treatments	none; condition can be arrested but damage cannot be reversed
Macular degeneration (atrophic)	vascular insufficiency	blurred or blotched central vision	usually occurs in adults over 60 years of age	none	none
Macular degeneration (exudative)	vascular abnormality	blurred or blotched central vision	usually occurs in adults over 60 years of age	early laser treatment in selected cases	laser treatment may arrest the progression of the condition. Otherwise no known cure
Optic atrophy	too numerous to list	peripheral field loss	any age	none	none

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Eye Pathology	Etiology	Visual Dysfunction	Usual Age of Onset	Medical Treatment	Cure
Retinitis pigmentosa (RP)	genetic inheritance	night blindness; progressive peripheral visual field loss which eventually leads to total blindness	childhood	none	none
Retrolental fibroplasia (RLF)	excessive exposure to oxygen in early life	overall cloudy vision or blindness due to proliferative retinopathy and/or tissue growth behind crystalline lens	premature infants	none	none
Strabismus	weakness of lateral eye muscles or disturbance in nerve innervation of those muscles	diplopia (double vision) may lead to amblyopia in one eye (functional blindness with no evidence of pathology)	at birth	surgery	usually good success with early intervention

Table 2
Conditions Involving Vision and Hearing Loss

Medical Condition	Etiology	Eye Pathology	Hearing Impairment	Usual Age of Onset
Cogan's Syndrome Type I	unknown	non-syphilitic corneal inflammation (interstitial keratitis)	tinnitus, vertigo, fluctuating sensori-neural loss eventually becoming severe and intractable	early adulthood; more often in males
Congenital rubella	maternal rubella; most damaging in first trimester of pregnancy	congenital cataract and glaucoma; may be unstable	mild to profound sensori-neural loss	at birth
Congenital syphilis	maternal syphilitic condition at conception	syphilitic inflammation of the cornea (interstitial keratitis)	progressive sensori-neural loss sometimes leading to deafness	adulthood
Diabetes mellitus	Insulin deficiency	Proliferative retinopathy often leading to blindness	sensori-neural impairment greater in high frequencies	usually adulthood but juvenile diabetes is a well-established phenomenon
Didmoad Syndrome	genetic inheritance	peripheral field loss 2° optic atrophy	progressive high frequency sensori-neural	early adulthood in persons with juvenile diabetes mellitus
Sickle-cell anemia	genetic inheritance	overall poor vision 2° proliferative retinopathy	severe sensori-neural loss greater in low frequencies	early adulthood
Usher's Syndrome	genetic inheritance	peripheral field loss eventually leading to total blindness 2° retinitis pigmentosa	sensori-neural loss, most often congenital and profound	late childhood

visually or dually visually and hearing impaired patient.

AURAL REHABILITATION STRATEGIES FOR CENTRAL VISUAL DEFECTS

When considering a program of auditory training for the dually handicapped, it becomes necessary for the audiologist to alter rehabilitation techniques. The patient whose central vision alone is impaired will have considerable difficulty discriminating fine visual detail. Speechreading skills may no longer be useful in compensating for the hearing impairment. Because people with central visual defects are mainly over 60 years of age, presbycusis is often the cause of their hearing loss. Consonant sounds, which are difficult for them to hear, are now difficult for them to see as well. This often leads them to believe that their visual and auditory impairments are neurologically connected and, as they lose one sense, they will necessarily lose the other. An explanation of the role of speechreading in compensating for a high-frequency hearing impairment is of great assistance to these patients. If the eye condition results in acuity which is poorer than 20/80 at a distance of five feet, speechreading training will not be a useful avenue to pursue (Romano & Berlow, 1974). A large central scotoma is also likely to interfere with a patient's capacity to see the lips or the face of the speaker, thereby negating the benefits of visual cues.

If speechreading does prove to be a viable training technique, lighting used in the therapy area is of considerable significance. Many people with vision problems, no matter what the cause or visual consequence, report glare to be one of the most debilitating conditions associated with their eye pathology. A low vision specialist, either an ophthalmologist, optometrist or low vision nurse, should be consulted regarding the type of lighting required to help with this problem. For more information about proper illumination, the reader is referred to a book by Faye entitled *Clinical Low Vision* (see Appendix B).

Hearing aid selection for the patient with poor central vision alone needs to be primarily concerned with help in understanding conversation. Fitting parameters (i.e., gain, output, frequency emphasis, and earmold style) are no different for this population than for those with normal vision. Eyeglass hearing aids are not usually the style of choice since many visually handicapped people use different optical devices for different visual tasks. It is impractical for more than one pair of eyeglasses to house the needed hearing aids. It is important to know if a patient uses low vision aids such as special lenses or magnifiers to see fine detail, since these devices should be utilized during hearing aid management training.

For those patients who depend on sign language for communication purposes, interpretation ability will be affected by a central visual impairment. Hand movements must be made in that portion of the patient's field where

vision is best and signs should be slowed down to help compensate for distorted visual clues.

AURAL REHABILITATION STRATEGIES FOR PERIPHERAL FIELD DEFECTS AND BLINDNESS

The patient who has no usable vision or an extensive peripheral field loss requires auditory cues not only for conversation but for orientation and traveling purposes as well. Hearing aids must provide this patient both with the ability to understand and with adequate localization skills in order to compensate for inadequate vision. This, of course, requires microphone placement at the ear and necessitates binaural hearing aid fittings for bilateral hearing loss. If the hearing loss is unilateral or asymmetrical, localization skills may be harder to achieve. CROS aids should then be considered.

Post-auricular or ITE aids are the styles of choice. Some severely hearing-impaired patients may require a body aid or auditory trainer for conversation and classroom, but these should be used only indoors since the microphone placement may impair localization skills needed for traveling. In order to select the proper amplification for mobility purposes, hearing aids must be tested *in situ* as well as in a sound-treated testing chamber. Whether this will be on a quiet suburban street or a noisy city street will depend on where the individual patient travels with the aids.

Because of the masking effects of wind and rain, many visually-impaired patients prefer not using their hearing aids outdoors. This problem can be partially resolved with a windscreen over the microphone.

The dually-handicapped person often uses audition to determine distance from a danger signal. Such need necessitates the omission of compression circuitry. The bus that is five feet away should not be made to sound like the car 50 feet away. If recruitment is a factor, a peak clipping circuit would have to be considered even though it may add the element of distortion to the patient's auditory cues.

People with severe visual impairments which affect independent travel need low-frequency as well as high-frequency information. It is not advisable to amplify only high frequencies for speech discrimination. Hearing aids with wide-band frequency response and external tone controls should be considered. The patient can be taught to set the tone control depending on the auditory need at that moment. Microphone type is also an important issue with this population. Uni-directional microphones are recommended for conversational settings, but traveling requires an omni-directional type. For this reason, it is advisable to fit hearing aids with dual microphone settings which the patient can manipulate depending on the listening situations.

The blind patient needs to rely on tactile cues rather than vision to master hearing aid management. Many patients with peripheral field defects, how-

ever, have adequate central acuity and can be taught to handle their aids by visual means. For those who cannot, plastic models of ears can be useful in teaching how to insert a hearing aid into the ear. Battery insertion and manipulation of external controls can be taught using enlarged drawings made with felt tipped pens or through tactile cues alone.

Speechreading abilities will be contingent upon the extent of sight remaining in the patient's central field of vision. Not all peripheral defects impinge on central acuity, certainly not in their beginning stages. Many patients with tunnel vision have extensive use of their central visual areas and can learn to speechread quite effectively.

Sign language communication requires enough adequate central vision to see hand movement. Fingerspelling will be more difficult for any visually-impaired patient to follow, but more so for those with central acuity difficulties. Tunnel vision, however, will also affect sign language interpretation because of the constriction in the area which now carries the visual image. Distance from the visually-impaired person should be determined individually to afford each patient the optimal visual fields. Signs should be delivered more slowly and the magnitude of the presentations should be reduced as well (Hicks, 1979).

SUMMARY AND CONCLUSIONS

The following is a summary of recommendations which should be employed when treating a patient with dual vision and hearing impairments:

1. Determine the existence and functional consequences of any non-correctable visual disorder through case history and contact with the patient's eye care specialist.
2. Select amplification which addresses orientation and localization needs as well as speech reception and discrimination capabilities.
3. Do not employ speechreading techniques if visual acuity is worse than 20/80 measured at a distance of 5 feet from the Snellen Chart.
4. Reduce glare in the therapy environment.
5. Adjust the speed, distance and magnitude of sign language presentations to promote better communication with the deaf/visually impaired patient.

Patients with dual vision and hearing impairments may not be receiving the best rehabilitation available to them. They are often treated separately for their vision and hearing disorders with no dialogue between managing health care professions. The purpose of this article has been to acquaint audiologists with the causes and consequences of a variety of eye pathologies so that aural rehabilitation techniques can be modified in accordance with a patient's visual impairment.

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APPENDIX A

QUESTIONS TO ASSIST IN IDENTIFYING POSSIBLE VISUAL IMPAIRMENTS²

1. Do you have any problems with your vision? What kind?
2. Did your doctor tell you what is causing your vision problem?
3. Does anyone else in your family have the same problem?
4. Do you wear eyeglasses or contact lenses? Do they help you see normally?
5. Do you use any other optical devices to see better?
6. Can you see my mouth clearly?
7. Do you have a great deal of trouble seeing at night or in dim light?
8. Do you bump into obstacles more often than other people?

APPENDIX B

READINGS FOR VISUALLY AND DUALY VISUALLY-HEARING IMPAIRED PERSONS

- Faye, E. *Clinical Low Vision*. Boston: Little, Brown & Co., 1976.
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- Kauvar, K. *Eyes Only*. Norwalk, Connecticut: Appleton-Century-Crofts, 1982.
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²*Editor's Note:* For further discussion of questions that may assist in indentifying possible visual impairments in the hearing-impaired population see F. Caccamise et al., "Visual assessment and the rehabilitation of hearing-impaired children and adults," *Journal of the Academy of Rehabilitative Audiology*, 1980, XIII, 78-101, and D. Johnson and F. Caccamise, "Visual assessment of hearing-impaired persons: Options and implications for the future," *Journal of the Academy of Rehabilitative Audiology*, 1982, XV, 22-40.