The practice of Low Vision Care

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When full visual performance is not available to the patient either from birth defects, injury, or the ravages of disease, where all possible medical care can no longer cure, the optometrist with low vision ability can do a great deal to rehabilitate this otherwise handiccapped patient. The first step is a thorough case history to establish the onset of the visual impairment, congenital, sudden or gradual. Is the impairment progressing and at what rate, and what curative procedures have been extended as well as will further curative measures be helpful, and at what risk. Is genetic council indicated?. How does the visual impairment prevent the patient from achieving in whatever fashion desired? What are the lifestyle needs of the patient, and what will it take in optical gadgetry, training, environmental changes, support, understanding and cooperation from family, friends, and or coworkers to aid the patient in achieving these needed goals. What are the patients interests, and what visual abilities are needed in fulfilling these interests. What is his chief complaint?. Then comes an analysis of the patient's visual system. A most important requirement is a good refraction including any extraocular muscle malfunction as well as qualitative field analysis, media impairment, optical surfaces distortion, and retinal and visual tract involvement.

What do I mean by "qualitative field analysis"? Actually measuring quantitatively functional field vs field lost is very helpful, but time consuming, and indicated when definitve information is needed. A good confrontation technique can provide a concept of peripheral field loss. Visual acuity and Amsler Grid testing can give a good idea of central field involvement. A confrontation technique I described many years ago has worked well for me, and has fulfilled the need to gather information quickly to aviod patient fatigue. I sit directly in front of the patient, and with one hand covering the patient's non tested eye. With his other eye the patient fixates on my eye. When the central field loss is large, seeing my eye may be difficult, but the position of the eye in the context of the large field occupying area of a face usually serves to maintain fixation adequately. The room illumination should be subdued, around 2 to 4 foot candles for more sensitive response .

To assure better contrast relationships, I use a wand created by cementing a 3 or 4 mm white circular spot cemented in the center of a black square about 3 inches on a side. This square is cemented on its back to a 1/8 inch dowel, 8 inches long. With the patient thus holding fixation, I can bring the black square from the non seeing area into the seeing area with wrist movement only. This avoids arm movement which would inform of target position. By noting the reported location of target visualization, I can derive a good idea of visual field size and shape. A good refraction to the point of best vision possible is a most important first step. I'll never forget the young man who came to my office wearing a pair of 4x plano bloptic glasses with which he couldn't pass the drivers test. With his plus 14.00D refraction correcting glasses he immediately achieved 20/70 vision, and I am sure, with time his vision improved, though I never had the privilege of follow up. Alding magnifying devices are added to this basic refraction. Now lets consider other conditions, and the helpful procedures. When visual acuity cannot be brought to normal even with a good refraction, the first suspicion might be A.R.M. because this is statistically a major cause of visual loss. Traquir's picture of an island of vision in a sea of blindness may be modified to depict macular degeneration as a hole right through the peak of the visual island. The rest of the visual island is left intact –the peripheral field is very good, but there is a central scotoma .

These patients respond best to head hed magnification. Persons who suffer any field loss resist any further encroachment of remaining field. Hand held or stand magnifying glasses confine vision within their borders. Thus, the patient is projecting his scotoma into the confined area of the magnifier, so there are missing details from the scotoma blocked spaces. Lovie-Kitchen noted the closer to the eye the visual task the smaller the ratio of projected blocking area of the scotoma to the field area. That is one advantage. However, as one holds the reading material within focus of the head microscopic lenses, and attempts to read in usual manner by moving the eyes across the page or by moving the head, as Feinbloom pointed out, the magnifying device also magnifies the movement. He called this the optical leaver. The print races by, and may induce nausea. The patient has to be taught how yo use his new glasses. He or she has to be taught to hold the head still and move the reading material from right to left while reading (in the countries of the type of language we use) from left to right. The following of the print is now governed by the proprioceptor sense to which the patient is accustomed and can accomplish well.

In doing this another wonderful thing happens. As the patient moves the tried to be seen material towards the blind area it is necessary seen by poorer seeing areas peripheral to the non seeing macula, but is magnified by the microscopic lens sufficiently to enable perception. As that group of letters slips into the blind scotoma area, a new group of letters still in the seeing area is visualized. Reading is very much easier, and becomes faster with development of this skill. Eccentric viewing is accomplished without effort. How do we know how much magnification is needed? Kastenbaum suggests as a start to invert the fraction. For instance: if the patient can only read the 20/200 letter, and wants to read newsprint.

News print can usually be perceived with about 20/40 vision. Inverting the fraction, we have 200/20 or 10x. 40/20 = 2 10/2 = 5. We try with the +5.00. maybe it is too strong or too weak, but it is a start. Because reference is usually to 25 cm distance, magnification of 1x is by a four diopter lens, 6x would be +24.00D. I usually look at it this way. If magnify 1x the 20/200 becomes 20/100. A second magnification allows the patient to see 20/50. A third 20/40. A forth 20/25. Fudge a little to assure accomplishment the first time and you have 5x to start with. These rules of thumb give a starting point. The final decision is by exposing the patient and watching performance against need. When so much of retinal tissue has been destroyed that optical devices cannot produce enough magnification for accomplishing tasks, we now have electronic magnification equipment which may provide adequate rehabilitation .

There are a few other considerations for macular non function. First, when of recent occurrance, the patient experiences shock and will not respond to therapy. Then the angry stage, why me to be singled out for such a catastrophy. It takes time for final recognition of the need for help, and the willingness to accept the help, which is now not as good as before, and requires the effort to master the device. Further, a major role for the macula is a binocular lock. Even though field is preserved, depth perception may become impaired. Proprioception brought in can often be very helpful. A cane may warn the patient where uneven surfaces can cause a fall.

Reading is not the only application that is impaired with macular disfunction. If the task is farther and greater distance is required such as seeing cards on a table, looking at the computer screen, shopping where magnification my be required to see markings on shelved products, reading music, etc., then a combination of a telescopic device either focusable or with reading caps as a telemicroscope can be employed . However, remember the point I made before. When field is lost further encroachment of field is not easily accepted. Necessity may demand, but it will be more difficult to train even though final acceptance can be achieved.

What about distance requirements? The inability to drive an automobile can be devestating to a lifestyle. Bioptic units are successfully employed in which magnification is supplied by telescopes, and the curtailed field of the telescope is by passed by raising the head a bit to view the road with the prescribed carrier lens. Telescopes and binoculars have their place in theathers, class rooms, as well as seeing distant street markers and house numbers.

Media opacities and irregularities can seriously impair visual performance. The scattered light masks retinal images.

A prominant example is cataract, also recognized as a major cause of blindness the world over. Enlarging the pupil to allow light to pass around opacities can be very helpful. This can be done with cyclopegic drops, but it is also helfpful to avoid the effects of light scatter with typoscopes , various filtering tints, varying illumination intensity and direction, and combinations such as the G & G light which Sam Genensky and I designed a number of years ago. Of course, cateractectomy with new surgical techniques, which are even stitchless, combined with implant optics, have made this a very acceptable remedy. Nevertheless, recent discoveries have implicated the high energy end of the sun's radiation as a major cause, so blue absorbing tints, easily available, can indeed be preventative or at least postpone the need for surgery. Prescribing such protective tints is urged.

Contact lenses may offer complete rehabilitation for corneal irregularities. The junction of cornea and air is the site of gratest index change of the refractive media of the eye. Slight variation of curvature can represent large refrative changes, so irregularities or segment variations in curvature in the protrusion, as in keratoconus, is not optically corrected by spectacles, but with contact lenses full 20/20 vision may be restored. In some instances, where the protrusion is very great, a corneal transplant may be necessary, but skillful fitting techniques may make this procedure unusual. Soft lenses, wich bend to the corneal shape, are not an adequate correction, but this may be overcome with a firm lens piggy back .

The approach I have found successful has been to prescribe a short radius back surface thick lens of high oxygen transmitting material. Then with increasing radii tools monitored by the fluorescent pattern of the lens on the eye, I have ground out the periphery until there is just light touch on the cone, a good contour fit in the periphery, and good edge clearance to assure quality tear exchange. The small index change between plastic and tears has not induced enough optical distortion to degrade the retinal image . To avoid lid irritation I have rounded off the front edge, monitored by observing the attack angle of the lid as it rolls over the edge of the lens. There are many approaches to aid patients with large field loss. The overall collapse of the peripheral field of Glaucoma is a major challange. High minus lenses hand held several inches from the eye can produce a reduced image to warn the patient of otherwise unseen peripheral obstacles. Of course the reduced image degrades details, so poor visual acuity can be a problem. This same effect can be achieved with a reserve telescope called a field expander. Again the use of a cane to provide proprioception input of surfaces not seen with such field loss should be considered in traveling. There are rumors of electronic canes for the future.

Dr. Feinbloom developed a lens system, using cylindric components instead of spherical as field expanders. These characteristically expand the field in the horizontal direction without shrinking the verticle dimention. This was to provide peripheral input yet still retain habitual vertical visual sensation.

In Retinitis pigmentosa where the major field collapse results from reduced illumination , new wide angle flash lights or spot lights to provide illumination seem to work best.

There have been numerous historical reports of alding patients with half of field gone, known as hemianopsias. Prisms were used mechanically held or cemented to spectacle lenses with base towards the blind area to shift the seeing area to replace some of the lost area. These were unsightly and produced color distortion as they were made stronger. Attempts were made to use prisms as mirrors to reflect information from the blind areas. These also were difficult to adjust to provide input from the most needed areas. The major problem I have alluded to earlier. Those who have lost field donot want to give up any of their remaining functional field. Prisms used in this fashion block areas of the seeing field to reflect information from the nonseeing field. Similarly, numerous attemp were made to use plane opaque mirrors to refle from the blind areas of field into seeing area While these permitted better ajustment for reflec ing perferred area, they did cut off some areas c the seeing field, which was cause for rejectio (Slide 24). When the fresnel wafer vinal stick o prism was introduced, higher powers could b used to provide queater field shift. They could b placed in they did cut off some areas of the se ing field, which was cause for rejection.