

BOOK REVIEWS

Visual Impairment in Children and Adolescents by James E. Jan, Roger D. Freeman and Ellen P. Scott, Grune & Stratton, 111-5th Ave., New York, 1977, 398 pages.

This excellent book is written by a multi-disciplinary team comprising a pediatric neurologist, a child psychiatrist and a social worker. They are part of a team involved in studying the entire blind population of British Columbia born between 1944 and 1973 who developed blindness before their twentieth birthday—a total of 454 children.

They emphasize that existing definitions of blindness are based on a single physiological measure (visual acuity) rather than on measures of functional ability. They suggest a classification system in which the term blind would only be applied to those who are totally blind or have only light perception (comprising one third of the “blind” population). The other two-thirds of their sample had some useful vision. Instead of the term legal blindness they recommend the term “visual impairment”—a loss of either visual acuity or one or more functions of the visual system. This is a term optometrists have employed for many years. For 30 years S. Howard Bartley and numerous optometric investigators and clinicians have stressed that impairment due to dysfunction of cells or tissue results in reduced or modified performance. Therefore vision must be evaluated by performance criteria.

With the virtual disappearance of ophthalmia neonatorum, ocular disorders due to syphilis, and retrolental fibroplasia, the major known causes of visual impairment in children are now due to heredity or rubella. This indicates the major thrust in prevention of blindness needs to be via genetic counselling and immunization against rubella. A short chapter provides a brief review of some salient genetic concepts.

One of the most compelling statistics from their study revealed that more than 70 per cent of the visually impaired had additional handicaps.

This included mental retardation (25%), hearing loss (10%), epilepsy (8%), and cerebral palsy (6%). This, of course, vastly complicates care since the multi-handicapped need a team approach in evaluation and follow-up. In terms of diagnosis they emphasize that description of ocular pathology is not synonymous with etiology. Thus the pathology might be optic atrophy but the etiology might be brain tumour, increased intra-cranial pressure, infection, hypoxia, etc.

Observation by parents and professionals is an important element of early detection. Lack of normal eye contact between infant and mother, abnormal eye movements such as a roving nystagmus, and an “out-toeing” walk with a wide base all suggest visual impairment and resultant delayed motor development. The authors stress the importance of presenting the original diagnosis to both mother and father. It is also important all family members be involved in habilitation, fathers and siblings as well as mother. Obviously these families have extra stress and tension placed on them and face family problems of attitude and emotion which must be met and resolved. Nevertheless, surprisingly, there was no increased prevalence of divorce or separation as compared to control group families.

As would be expected there are numerous effects of blindness on general development. In the absence of sight, these infants live in a frightening world. Mother suddenly comes upon them and may equally as suddenly disappear. Similarly, when movement is achieved many objects are first sensed only by bumping into them. For infants in the prone position, head lifting with arching, normally triggered by visual curiosity, is infrequent. Hearing will not compensate for this lack of sight until after one year of age when it can trigger motor activity. Vision normally acts to unite the tactile and sound qualities of objects. Until the end of the first year these qualities remain separate for the blind child. Eye-to-eye contact is an important

part of the development of the infant-mother bond. This too, is of course lacking, delaying the development of this critical aspect of emotional growth.

The infant's watching of his own hand at four months is the beginning of visual-motor coordination. Sighted children can learn hand skills by imitation and hand and mouth develop separate autonomy. For the blind child the hand remains in alliance with the mouth and acts as if there was nothing out there. At five to six months the lack of vision interferes with the developing of creeping. Grasping or walking toward an object also cannot occur until conceptual development is far enough advanced to permit association of the object with the sound cue. Independent walking is markedly delayed probably because of the lack of development of a mental map of the environment. Vision plays a major role in good postural balance but the totally blind must rely entirely on vestibular and proprioceptive information.

Speech is less firmly connected with sensory experience so that vocabulary may be acquired even though the meaning may not be understood due to a lack of visual experience. In communication, sighted children imitate gestures and expressions of other people. They also thereby learn to understand unspoken body language and facial expression and to communicate by their own body language. Lack of sight often results in blind mannerisms. These stereotyped mannerisms often disturb parents and observers. They tend to evoke suspicion of mental retardation or emotional disturbance. They include rocking, eye poking, hand-flapping and hand movements from side to side. These are likely to decrease with time and early mobility.

Multiple stimulation and experience permits the child to acquire behaviour patterns incompatible with stereotyped behaviour. Vision also facilitates smiling which is delayed in blind babies. Subtle facial expressions are developed by imitation and their absence in the blind may cause difficulties for observers in understanding and interpreting their feelings.

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Perceptual and cognitive development is adversely affected by visual loss. Space perception involves body image, constancy and visualization. Vision is of great importance in learning to differentiate the self from the non-self. The blind need special help in developing self concepts. The conceptualization of space is very difficult for the blind child lacking visual information of surrounding space. Hearing confers object constancy only at a later age. Mobility is obviously handicapped by a lack of vision. Even a small amount of vision seems to provide a useful framework for interpreting information from other perceptual modalities and effecting inter-modality organization.

Some cognitive deficits may arise because no other input channel can match the rate of visual processing. Other apparent deficits may be due to the fact that the tasks are influenced by visual cues and lower performance reflects lack of vision and not lack of cognitive ability. It is unclear whether significant differences in perception and cognition occur in the long run. However, it is necessary to structure the experience of the visually impaired to facilitate the development of compensatory non-visual channels.

Developmental disorders are present in 41% of the blind but only 8% of those with partial sight. This points out the importance of vision, even reduced vision, to general de-

velopment. Behavioural problems are much more prevalent among the visually impaired although not inevitable. They have more problems in peer relationships and have fewer social opportunities. Behaviour disorders are often associated with family factors making it essential that there be early and ongoing supportive programs for families.

Very little information is provided for assisting the partially sighted. Suggestions are primarily with respect to placement close to the blackboard, utilizing a felt pen for writing and an easel for reading, and individual teaching assistance. There is only cursory mention of low vision aids. The authors stress that there should be a multi-disciplinary approach to rehabilitation and recommend that low vision clinics should be within an agency serving the blind.

The chapter on the Deaf-Blind Child perhaps most effectively illustrates the principle which must be applied in the habilitation of children with impairment whether mild or severe as discussed here. The enormity of the loss of the two major teleseptors can certainly be understood by any optometrist. The basic goal of the program is to establish communication by whatever means can be received by the child, to develop a positive self image from birth, and to utilize whatever residual vision and hearing remains. Underlying these three areas must be an emotional bond established between the therapist and the child

as well as the parents and the child.

The actual programming of education involves seven areas; 1) Social and emotional development, 2) Living skills, 3) Orientation and mobility, 4) Language development, 5) Cognitive (conceptual) development, 6) Perceptual development, 7) Gross and fine motor development.

This is a program whose principles could be applied not only to gross visual impairment but also to all less severe visual dysfunction. While this book only touches on the area of therapy, optometrists will recognize that the developmental principles which apply to therapy for strabismus, heterophoria, visual-motor and perceptual-motor difficulties also apply, and should be instituted, in the therapy for the blind. The optometrist has a valuable role to play because of his/her unique background in those areas.

As so often happens, consideration of pathological dysfunction helps our understanding of normal physiological development and function. This book is useful not alone for its insight into the nature of the adjustments that must be made by the impaired in all areas of life. It is equally valuable for its contribution to understanding the impact of reduced vision on development of function and behaviour.

This book should assist every optometrist to broaden his/her understanding and clinical management of the visually impaired.

Marvin A. Langer, M.Sc., O.D.

The Pathogenesis of Nerve Damage in Glaucoma: Contributions of Fluorescein Angiography, by George L. Spaeth, M.D. Published by Grune and Stratton, 1977, Clothbound, 153 pages plus index and table of contents. Price \$19.50 U.S. funds.

The author discusses two theories concerning the pathogenesis of optic nerve and retinal damage in glaucoma and classifies glaucoma patients into four categories. The theories are:

a) The mechanical theory (Müller) incorporates these factors:

- the vitreous presses the optic nerve fibers against the edge of the cup (and may also squeeze out extracellular fluids from the disc)

- secondary atrophy of glial and nerve fibers occurs

- retinal ganglion cells and their axons are damaged

- a decreased flow of axoplasm occurs in the optic nerve

- possibly a distortion of fenestrae in the lamina cribrosa due to the direct pressure.

b) The vascular concept (von Jaeger) includes:

- decreased capillarity of the disc

- the vascular supply of the lamina from the "posterior scleral wreath" suffers when these vessels are compressed

- foci of necrosis in the optic nerve. Cavernous changes in the optic nerve resulting from vascular insufficiency

- selective atrophy of radial peripapillary capillaries (but their role is not yet clear)

- inadequate perfusion of the optic nerve occurs in systemic hypotension or ocular hypertension. As many as 60% of patients with chronic open-angle glaucoma have cardiovascular disease. There may be a local disease of vessels in the eye.

- systemic hypotension can produce an oval scotoma in the Bjerrum area

- fields deteriorate when blood pressure is lowered but higher systemic pressure protects glaucoma patients from field losses

- increased IOP decreases blood flow in both the choroid and the prelaminar portion of the optic nerve and reduces oxygenation of the tissues supplied by the uveal circulation and the deep prelaminar portion of the optic nerve
- retinal oxygenation decreases when the IOP is raised or BP is lowered if the extent of these changes is sufficient to overcome the autoregulatory capacity of the retina or the surface of the optic nerve head
- the prelaminar disc tissue is more sensitive to increased IOP than is the central retinal circulation
- occlusion of the short posterior ciliary arteries and the pial vessels results in optic nerve damage
- vascular insufficiency of the choroid seems not to be significant in the development of glaucomatous nerve damage.

Glaucoma patients can be classified into the following four categories:

1. Analysis indicated that 12% of his glaucoma population belonged in the first category. Here the intraocular pressure is elevated and no ischemia is apparent, the patient shows:
 - a normal fluorescein angiogram, but some enlargement of the optic cup
 - some posterior displacement of the disc surface
 - field losses which tend to be more peripheral than central
 - little or no relation between the course of glaucoma and the systemic blood pressure.
2. About 11% of his glaucoma patients made up his second category. In these patients primary ischemia of intraocular structures is presumed to be the mechanism, there is normal IOP but glaucoma-like involvement of the optic nerve head. More than 1/3 of them had diabetes, some had cardiovascular disease and a few had syphilis. The low tension glaucoma patients seem to belong here and fluorescein angiography is especially useful in these cases. Patients in the second category showed:

- hypofluorescence especially inferotemporally, focal ischemia of the disc
 - shallow eccentrically placed cupping, saucerization
 - more pallor than would be expected from the size of the cup
 - some had small hemorrhages on the disc, inferotemporally
 - a dense paracentral scotoma affecting the superior field. Patients were often aware of the field defect.
 - IOP ranged from 15 to 19 mm Hg and the coefficient of aqueous outflow was normal.
3. About 36% of his glaucoma patients appeared to belong in the third category, these he considers to be suffering from secondary ischemia. In this group the hypoperfusion and disc damage are presumed to be the result of the elevated IOP. They showed:
 - optic nerve hypoperfusion which varied with the height of the IOP
 - inferotemporal or superotemporal cupping
 - arcuate scotomas which varied with the height of the IOP.
 4. Among his group of glaucoma patients 41% did not fit readily into any of the above three categories and therefore constitute a fourth category. The author concludes that in many cases the development of glaucomatous changes in the disc depends upon a combination of factors.

Some cases showed areas of hyperperfusion before field defects could be found. Spaeth emphasizes in *Transactions of the American Academy of Ophthalmology and Otolaryngology* 81(2): OP233, 1976 that visual field loss is the issue of central importance and the examination of the disc alone is not adequate for diagnosis nor follow-up of glaucoma.

Angiograms of 25 patients are shown and these are correlated with the other data obtained in a careful work-up of their condition. There are 64 black-and-white figures and extensive references.

Optometrists can learn much from this book.

W.M. Lyle, O.D., Ph.D.

Do You Really Need Eye Surgery?
Second Edition, William H. Havener, M.D., Charles C. Thomas & Co. 301-327. E. Lawrence Ave., Springfield, Ill. 62717

This small text (87 pages) was written primarily for the patient who must consider the possibility of eye surgery. Its author, William Havener M.D., a professor of ophthalmology at Ohio State, has obviously had extensive experience in counselling patients regarding the necessity for eye surgery.

The book is divided into 13 balanced chapters, including discussions of cataract surgery, retinal detachment, glaucoma, strabismus, plastic surgery and corneal transplantation. In each chapter, Dr. Havener attempts to describe the methods of surgery and the associated risks involved without minimizing the benefits.

One area sure to find disagreement would be the chapter on orthoptics where he warns patients about the charlatans in the field and that a "sucker is born every minute" — hardly appropriate for a text of this type. As one would expect in a text written by an ophthalmologist, there is a decided propensity toward advising routine eye care by local ophthalmologists.

Truthfully, the majority of the text is quite simplistic in trying to give the layman some indication of the reasons for eye surgery and the accompanying risks. I felt that the most useful chapter for both layman and optometrist, especially in counselling his patients, was the chapter on "Meaning of eye symptoms" and some useful information in the "Prevention of Blindness". Dr. Havener discusses aches and pains, headaches, dryness, burning, itching, watering tired eyes, floating spots, diplopia and sudden loss of sight. He attempts to describe the possible danger of minimizing the warning signals and the danger of do-it-yourself diagnosis. The chapter is useful for all optometrists.

The chapter on the "Prevention of Blindness" is an added piece of information for the reader although not necessarily appropriate in a book about surgery. Dr. Havener gives some interesting statistics (i.e. there are 30,000 new cases of blind-

ness yearly in the U.S. alone with the cost of caring for the 300,000 blind approaching 150 million dollars). He also describes seven eye danger signals that are extremely well defined. Every patient would be helped if they knew the danger of:

1. Continuing redness
2. Continuing pain
3. Trouble in seeing — loss of vision (side), double vision
4. Crossed eyes
5. Growths
6. Continuous discharge and
7. Pupil changes. He goes on to give some good information regarding first aid.

Practising optometrists, in general, could find reasons for disappointment in this small text. The student, or some of our well informed patients, however do receive a useful discourse.

H.B. Mayers, O.D.

New and controversial aspects of vitreoretinal surgery, edited by Alice McPherson, C.V. Mosby, St. Louis, Missouri, 1977, 441 pages, index, \$59.75.

This book is drawn from papers presented at a symposium on vitreous surgery held at the Texas Medical Center in Houston in 1975. It is clearly intended as a book on surgical technique: more than half the volume is devoted to discussion of instruments and techniques.

Retina-Vitreous Relations

The early chapters give a good review of the basic anatomy and pathology of the vitreous, and emphasize relations between the vitreous and retina: these relations play a major role in development of both vitreous and retinal problems. There is normally a blood-vitreous barrier, which controls (physically and physiologically) the entry of cells and other substances into the vitreous. When this barrier is altered (as by uveitis), white blood cells and fibrinogen may be allowed into the vitreous: this will lead to formation of clumps of cells and fibrin in the vitreous. These materials may be removed by phagocytes from retinal circulation; however, as the blood-vitreous barrier returns to normal, these deposits may not be entirely removed. Vitreous detachment may cause breaks in the inter-

nal limiting membrane of the retina: glial cells from the retina may wander through these breaks and proliferate to produce cellophane-like preretinal membranes which are known to produce folds and puckers in the retina as they contract. In diabetic retinopathy, it is postulated that increased glucose levels upset the metabolism of the vitreous cortex, causing it to thicken and develop stronger attachments to the large retinal blood vessels; increased glucose levels in the vitreous in turn are suggested to cause liquefaction of the vitreous, with the development of posterior vitreous detachment. This causes traction on the retinal blood vessels, leading to hemorrhage and anterior displacement of newly-formed blood vessels.

Instruments & Techniques for Vitreous Examination

Various scleral indentors and three-mirror contact lenses are evaluated. The reader is reminded that red-free illumination improves the contrast of vitreous structures (such as membranes). Close to the retina, however, vitreous structures are harder to see, due to retinal reflections: an image-intensifier slit-lamp attachment is described which makes it possible to employ a polarizer and analyzer to reduce retinal and other reflections. An interesting and novel development involves the addition of a line-filament light source and projection system to a conventional head-mounted indirect ophthalmoscope: this enables the observer to obtain a slit-lamp view of vitreous and retina at any time during the course of indirect ophthalmoscopy. Localization of vitreal and retinal abnormalities is thus greatly facilitated.

Clinical Testing

Preoperative evaluation of patients with vitreous opacities is discussed at length. The patient with extensive vitreous opacities is much less amenable to assessment than is the patient with dense cataract: light projection, red-green discrimination, Maddox Rod orientation, and Marcus Gunn pupillary response tests are of no prognostic value in patients with extensive vitreous opacity (e.g. in proliferative diabetic retinopathy). The authors suggest a

very useful teaching technique to produce a Marcus Gunn response in a normal patient: placing a neutral density 2 filter before one eye will produce a marked positive Marcus Gunn pupillary response (positive swinging flashlight test). Even the Purkinje tree phenomenon, (the subjective report of seeing a black, tree-like pattern against a red background when the temporal globe is transilluminated through the closed lid), is of little value where the vitreous is very cloudy, as it may not be observed even in eyes with a perfectly normal posterior pole. Two additional diagnostic methods receive extensive discussion: bright-flash electroretinography and ultrasonography. In eyes with opaque vitreous, it may be necessary to increase the intensity of the ERG flash by 4 log units in order to produce a recordable ERG.

Vitreous Surgery

Vitreous surgery is accomplished by one of two methods: either by making an extensive incision around the limbus and turning back the cornea (the 'open sky' technique) or by insertion of a fine probe (about the diameter of a mechanical pencil lead) through the pars plana. The latter technique requires only a very small incision, which often will heal without the need for sutures. A large number of most ingenious instruments have been developed for the latter method: these instruments permit the cutting of vitreous and other structures; removal of this debris by suction; replacement of the aspirated materials with saline (so normal IOP is maintained); internal illumination of the eye during surgery; direct application of heat to intraocular blood vessels.

Counselling

This book is very useful for counselling patients with vitreous/retinal problems, as it gives a great deal of information on indications, contraindications, success and failure rates for surgery. Here are a few examples of conditions amenable to treatment by vitreoretinal surgery: vitreous hemorrhage, dense asteroid bodies, diabetic retinopathy, retinal detachment due to vitreous traction, and removal of secondary cataract (aftercataract). Most of the

authors advise against surgery for vitreous hemorrhage within 12 months of the bleeding: such opacities frequently will be reabsorbed spontaneously within that time. Vitreo-retinal surgery is contraindicated for patients who will not stand general anaesthesia (cardiovascular problems, kidney problems) and for patients with extensive rubeosis iridis (these patients usually develop an intractable glaucoma following surgery). Success rates are encouraging for patients with intra-ocular foreign bodies and cystoid macular edema due to vitreous traction (90%); non-diabetic vitreous hemorrhage is successfully treated in 80% of cases; diabetic vitreous hemorrhage and retinopathy are successfully treated in 60% of cases. An interesting note is made concerning possible future treatment of diabetic retinopathy: it may be preferable to obliterate new blood vessels using heat and then to remove the remnants by vitrectomy **before** any hemorrhage occurs.

Conclusion

This book would be useful to the optometrist in a large group, (or multidisciplinary), practice. I have attempted to present the highlights which I think could be of use to the general practising optometrist.

T.D. Williams, O.D., M.S., Ph.D.

Ophthalmic Dispensing (Third Edition) by Russell L. Stimson, Published by Charles C. Thomas, Springfield, Illinois, U.S.A.

This book, nearly 700 pages in length, "continues to emphasize preparation for the National Academy of Opticianry examination" in the U.S.A. In this edition new mate-

rial has been added in the area of eye anatomy and physiology, optics and associated mathematics, as well as optical aids for sub-normal vision.

The book will have appeal to a broad segment of the optical industry despite the fact that certain parts of the book deal with explanations of various examination procedures which may lie beyond the interest of the majority of opticians.

The emphasis on accurate fitting techniques and the reasons for attaching such importance to them are well set out. It merits review by all who engage in dispensing ophthalmic materials. There are a few minor shortcomings but these do not detract from the worth of the new edition. All in all, a book worth having in the office library.

Ray Pellowe, O.D.

Reading Aids for the Partially Sighted: A systematic classification and procedure for prescribing, Louise L. Sloan, Ph.D., The Williams and Wilkins Company, 428E. Preston Street, Baltimore, Maryland. USA 21202

In her introduction, Sloan briefly describes the developments which have occurred in the field of low vision care since 1955. She points out that during this period a systematic procedure for the selection of low vision aids and a consistent system for rating low vision aids in terms of their magnification and uses, was never developed. Combined with this fact was the problem that practitioners were hesitant to prescribe low vision aids because they felt their patients would not accept them or use them. This, Sloan feels, is one of the greatest obstacles to the delivery of low vision care. Her book attempts to deal with each of these problems in turn.

The first chapters offer explanations of basic optical principles which should

serve as a good review for most practitioners. Subsequent chapters deal with the low vision examination itself, and the modifications which must be made to a "standard" visual examination. She then goes on to point out the various inadequacies of the present classification methods in describing many optical low vision aids. She shows how they may be properly evaluated and systematically described in terms of their magnification. She then attacks the problem of selecting the proper low vision aid to suit the patient's low vision condition. This is done in a very orderly and logical manner which should prove quite valuable to anyone working with low vision patients for the first time.

Special problems in prescribing aids for children and other patients who require special illumination levels are discussed. The final chapter deals quite briefly with telescopic units. The book's three appendices describe (i) non-optical low vision aids (ii) factors relating to the success or failure of low vision aids and (iii) illustrative case histories of varied types of low vision patients and how they were treated. A special noteworthy point in appendix III is Sloan's discussion of the importance in knowing the central visual fields of the patient and how this knowledge is used in the selection of the proper aid as well as the proper method of training the patient in the use of the aid.

While Sloan's book is certainly not exhaustingly comprehensive in the discussion of low vision and all its ramifications, it does deal with a wide range of practical problems within the area. She seems to have succeeded in her efforts to deal with problems she mentioned in her introduction. Most optometric practitioners should find this book pleasant to read, easy to understand and valuable in terms of the practical knowledge which can be gained concerning the delivery of low vision care.

John D. Jantzi, O.D.

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