

PRESCRIBING FOR THE STRABISMIC PATIENT

BY

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Other authors have dealt with examination in strabismus and with orthoptic procedures. The use of drugs and surgical procedures are also beyond the province of this discussion which will be limited to the application of visual appliances to help develop conditions necessary to binocular vision, to maintain binocular vision, or to prevent diplopia, and to a general rationale of strabismic care.

To Develop Binocular Vision

Very young squinters frequently have refractive errors which if corrected will permit binocular vision to develop — more readily if orthoptics is instituted as soon as feasible. The retinoscope and the keratometer are important instruments in determining lens correction for young children. If the infant is strabismic it is doubly important that refractive status be determined and errors corrected.

Refstetter, 1946 found that the distribution of ACA ratio in squinters was not significantly different than that of normal subjects. The ACA ratio is, therefore, an important factor in lens prescription for the young strabismic. This can sometimes be determined by using phoria targets in a stereoscope type instrument as well as by routine testing as early as three years of age. Phoria positions noted with various lens powers should be undertaken as well as using targets at the far and near shaft settings. Modification of the lens prescription on the basis of the ACA ratio may permit a young strabismic patient to develop binocular vision. Observation of pupillary accommodative reflexes may also be useful. We should attempt to eliminate the accommodative reflex by plus adds in esotropes, particularly if a high ACA ratio is found. Minus adds might be indicated in exotropes with normal ACA ratios and even those with high ACA ratios if the cover test indicates binocularly is obtained. For young exotropes with a low ACA ratio the prism

may permit binocularity to develop. In esotropia with a low ACA ratio B. O. prism is indicated.

The above procedures are prefaced on the existence of good visual acuity in either eye, and work best when the tropia is not constant. If amblyopia exanopsia is suspected, or of it can be determined by testing, occlusion should be undertaken along with lens and prism correction. Two tests are useful in distinguishing disuse amblyopia from that caused by organic conditions. If visual acuity is better for isolated letters of figures than those shown in series, or if acuity is maintained or improved as target illumination is decreased then visual acuity is likely to improve if the fellow eye is occluded. A light tight patch worn for three weeks should permit significant improvement if the prognosis is to be good. An opaque contact lens is an excellent occluding device, particularly for older children. The best refractive lens should be worn before the amblyopic eye at a times. Occlusion should also be used at an early age to prevent amblyopia when binocular vision cannot be achieved. Eccentric fixation is likely not an early variant of strabismus, however, some estimate as to its presence in the very young patient can be made by the Hirschberg test and by noting the ophthalmoscopic reflex. As the light image is centered in the pupil the reflex will often have a grayish cast in direct fixation and an orange hue in eccentric fixation. If eccentric fixation is only suspected alternate occlusion is indicated.

To Maintain binocular fixation

The above procedures have dealt with the very young patient who has not yet developed binocular vision or with older children who have developed suppression, amblyopia, or eccentric fixation each of which acts as a deterrent to fusion. If a patient has been brought to the point where he can fuse at the squint angle or less, or if he has no deterrents to fusion except low fusion amplitude, then prism correction is indicated. In such cases the author has seen prism as great as 22 Δ used effectively in maintaining fusion. Fusion amplitude training is often effective in permitting gradual reduction of the prism correction in such instances. ACA ratio is more readily determined in older children and should be accounted for in prescribing. Two problems are associated with the prescription of prism. Aberration, dispersion and distortion effects can prevent successful adaptation. Morgan¹ recommends dividing the prism equally between the two eyes, making the prism on a steep front curve, keeping the prism as thin as possible, and lens coating to minimise the disadvantages.

Hofstetter² reported increases in the squint angle following application of prism in concomitant squint of long standing and later reported³ a case in which the angle of esotropia increased equal to the amount of prism prescribed. The subject

was, however, an adult with anomalous correspondence and a squint of long standing. Carter⁴ also reported finding this adaptation to the use of prism in normal subjects, but much less often in instances in which low fusion amplitude and high phorias were found. Therefore, when prism is prescribed careful attention must be paid to the optical factors and frequent progress reports need to be made to determine whether the adaptation phenomenon results.

Many strabismics have vertical components to the squint. Correction of the vertical deviation is a necessary part of the prescription. The vertical prism may sometimes be reduced after orthoptics or as maintenance of fusion is sustained over a period of time.

While the strabismic child may not have the capacity for fusion following surgery its discussion is included under this heading because if surgery is to have a good prognosis for functional cure, surgery will be undertaken only after orthoptics has been attempted to eliminate amblyopia, eccentric fixation or anomalous correspondence. Therefore, pre-surgical orthoptics is indicated whenever these conditions exist, and surgery is only indicated if the combination of fusion training and lens prescription does not permit sustained binocularity. In any case the prognosis is improved by post-surgical orthoptics and by careful attention to refraction, ACA ratio, and residual deviation.

To eliminate diplopia

If deterrents to fusion cannot be eliminated, or if diplopia results from an acquired strabismus and cannot be eliminated by prism then occlusion of the deviating eye is often necessary. A frosted lens serves this purpose well, however, a contact lens with an opaque center portion is cosmetically superior.

The incomitant squinter can often maintain binocular fixation through a limited fixation field by tilting or rotating the head. The elimination of diplopia causes relatively fixed postural changes. The use of prism can sometimes achieve the same result while permitting normal head posture. The head is turned toward and the eyes away from the maximum action field of the underacting muscle, i.e. in paresis of the right medial rectus the head would be turned to the left and the eye to the right. Base in prism before the right eye would compensate for the muscle anomaly with the head in the primary position. A general rule of thumb is that the base of the compensating prism should be in the direction of the head turn or tilt.

There are many useful resources for treating the strabismic patient. These resources include the prescription of lenses and prisms, and occluding devices, orthoptics, pleoptics, drugs and surgery. They are not as effectively used as they

should be because of interprofessional feuding and because professionals have not maintained sufficient competence to deal with a group that constitutes probably less than 5% of a typical practice. But every optometrist has at the very least the obligation to recognize the condition when it exists and having recognized to follow recognized procedures of handling or of refer the patient to someone who will. How that we have made some general statements concerning the use of lenses to aid in developing binocular vision, to maintain binocular vision and to eliminate diplopia let us approach the problem of how to handle individual patients.

Infants

When a child less than one year of age has strabismus or appears to, there are several questions that the responsible optometrist will want to answer.

Squint at this age is often associated with prematurity, infection or toxemia during pregnancy, difficult delivery, of familial tendency. If none of these possible factors is present the squint is much more likely to be apparent, (apparent esotropie being more common due to epicanthal folds). If the squint is real and constant some attention needs to be given even at this early age to maintaining useful vision in the squinting eye and alternate occlusion should be employed. Retinoscopy can be performed at this age and if esotropia is found with medium to high hyperopia plus lenses should also be employed. This is the more usual condition, however, especially in premature infants myopia and exotropia may be encountered, in which case minus lenses are indicated. When squint develops after the age of one year, but before routine visual and strabismus testing can be undertaken the optometrist should be concerned with preventing amblyopia by occlusion and with accommodative factors in squint.

Children

At the age of three to four years additional essential information can be gained. More accurate assessment of the refractive status is possible, determination of the ACA ratio, degree, and periodicity of the squint. If the squint is of recent origin lens prescription modified by attention to the ACA ratio and alternate occlusion are indicated. If the squint is of long standing then occlusion of the fixing eye for several days at a time should be done. When occlusion is employed frequent acuity checks are necessary to prevent deterioration of acuity in the better eye.

At the age of six or seven years most of the tests for strabismus can be made. This is the beginning of the most fruitful period for employing orthoptics and pleoptics procedures. The prognosis for these is much better if amblyopia, ano-

malous correspondence, or eccentric fixation have not developed. It is at this point that a pleoptics or orthoptics program should be initiated with early evaluation to determine the feasibility of surgery which is not often indicated in the absence of deterrents to fusion if the squint angle is large and has not reduced with orthoptics. In such instances, the prognosis for functional cure is good. If deterrents to fusion are present functional cure is less likely, but surgery should even then effect a total or partial cosmetic cure. Post surgical testing, pleoptics and/or orthoptics and lens and prism prescription should again be undertaken.

Adults

When an adult strabismic is encountered he usually fits into one of the following categories.

- a) long history of unsuccessful treatment
- b) high phoria, occasional squint
- c) squint of long standing, no treatment
- d) squint of recent origin.

Those with squint of long standing which has not been successfully treated rarely respond to non-surgical treatment. Prism correction may be attempted, or surgical correction to effect a cosmetic cure may be recommended.

Those with high phorias and occasional squint are the best subjects for optometric care. Fusion amplitudes are relatively easy to improve particularly base out amplitude in exotropia. If a vertical component exists this should be corrected with prism and fusion amplitude training initiated.

When the squint of long standing and no treatment has been given, the patient has usually made an adequate adaptation and only cosmetic factors are ordinarily amenable to improvement. Compensatory prism in head tilt, or cosmetic surgery may be indicated. In the rare instance in which no deterrents to fusion exist orthoptics may be beneficial.

Squint of recent origin is often associated with neural pathology or injury. It should first be considered as to its diagnostic implications. If it results from a condition that is not amenable to medical treatment then prism correction and orthoptics may be usefully employed.

The foregoing is not presented as a guide to those who have gained experience in the field of strabismus care. They will recall exceptions to the rules which are

presented. It is intended as stimulus and guide to those who have yet to make strabismus testing and treatment an essential part of their practice.

Strabismus is amenable to treatment providing good testing is carried out, treatment is instituted as early as possible, and providing pleoptics, orthoptics, drugs, surgery and lens application are used judiciously. Much can be done to prevent complications by applying lenses to correct refractive status, to affect accommodation, to control convergence, or to occlude,

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