REFRESHER COURSE FOR GENERAL PRACTITIONERS

TREATMENT OF SQUINT IN CHILDREN

BY

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Although in the treatment of certain disorders of function of the human body it may be expedient to adopt a "wait and see" or expectant policy in the hope that the condition will right itself with the passage of time, such a policy should not be adopted in the treatment of squint in children, an exception being made only in the case of an infrequent intermittent squint lasting but a few seconds, which is sometimes encountered in young infants when teething. Many cases of squint are rendered unnecessarily difficult to treat because they have been neglected in the early stages.

Squint is apt to be regarded purely as a physical deformity. People are inclined to forget that a squint results in the loss of an important physiological function—namely, that of binocular vision. When a squint is present the visual axes of the two eyes are not pointing in the same direction, hence the two eyes cannot be used together to obtain binocular vision, and as a result there is loss of the ability to appreciate perspective.

One would naturally expect that, if the eyes were looking in different directions, diplopia would result, as indeed it invariably does in the case of an adult who, having previously possessed normal binocular vision, has acquired a squint as a result of an ocular palsy due to disease or injury. In the case, however, of a young child whose binocular functions are as yet not fully developed, diplopia is at the most only a fleeting symptom. Mental suppression of the image formed in the squinting eye rapidly takes place. This usually gives rise to a definite loss of vision in the squinting eye (amblyopia), unless the squint alternates from one eye to the other. Amblyopia, if allowed to develop, may require prolonged occlusion of the non-squinting eye before it is overcome.

It should be realized by all who are responsible for giving advice to parents about a child's squint that once a permanent squint has become established it will not disappear without adequate treatment. The fact that in some cases of (untreated) unilateral convergent squint a gradual reduction of the angle of deviation may occur, rendering the eyes cosmetically straight by about 40 to 50 years of age, albeit without the function of binocular vision, and possibly with one relatively blind eye, is no excuse for not treating the condition adequately in infancy.

Diagnosis

Unless a squint is diagnosed in the early stages it is idle to talk about the importance of its early treatment.

Although a squint of large degree, especially a convergent squint, is obvious to any casual observer, one of small degree, and none the less important for that, may easily be overlooked. A squint of not more than 10 or 12 degrees may be undetectable by mere inspection, and may necessitate refined methods of examination for its diagnosis. On the other hand, one

must bear in mind the possibility of the existence of an apparent squint. The illustration shows a case of pseudo-convergent strabismus, in which it was thought that a squint was present, but the squinting appearance

Pseudo-convergent-strabismus due to broad epicanthic folds.

was due to the presence of broad epicanthic folds. These made the eyes appear to be "closely set" when the gaze was directed forwards and made the adducting eye appear to turn in excessively when the gaze was directed to one side.

A squint of sudden onset is naturally easier to detect than one of more gradual onset, especially if the latter is only slowly progressive. At its onset a squint may be variable and intermittent, or it may occur only in certain directions of the gaze and for certain distances of fixation. Precise information about the mode of onset, the exact anomaly observed, its variability and duration, and other details given by an intelligent observer are of the utmost importance. A squint of the intermittent type may not be "obliging" at the time of examination, but if there is a clear-cut history of such a condition given by a reliable observer the diagnosis is unlikely to be in doubt.

It is also desirable to inquire into the family history, for in a doubtful case of squint a strong family history of the condition makes one more suspicious.

The simplest test for the presence of a squint is as follows.

Make the child fix his gaze on a spot-light (in the case of a young infant it is advantageous to keep the light flashing on and off in order to attract attention), then, while watching the right eye, quickly occlude the left eye: if the right eye exhibits a movement in order to take up fixation of the light as soon as the left eye is covered, it follows that it must have been squinting before the left eye was covered. The direction of such a movement of the right eye will give evidence of the direction of the squint—for example, if the right eye turns outwards to take up fixation it must have been in a convergent position before the left eye was occluded, and therefore there is a right convergent squint. There will be a precisely opposite observation in a divergent squint and comparable observations in vertical squints. If, on the other hand, the right eye remains fixing the light, there is no manifest squint of the right eye.

A similar procedure is then carried out, covering the right eye and observing the left eye. The test should be repeated at least twice to ensure correct observation. Furthermore, the test should be carried out if possible using a distant fixation light as well as a near one, for sometimes a squint may exist when the gaze is directed in the distance and not when it is directed towards a near object or vice versa.

As a result of this "cover test" it will be clear whether there is (a) a manifest squint of the right eye, (b) a manifest squint of the left eye, (c) an alternating squint of either eye: it will also determine the type of deviation and whether the squint is present both for near and for distant fixation or only for one or the other; or (d) no manifest squint of either eye, in which case the test may demonstrate the presence of a latent squint—that is, a deviation of the occluded eye due to dissociation, with recovery of binocular fixation when the occluder is removed.

Although this test can be easily carried out by anyone not fully versed in ophthalmology, the following difficulties may be experienced: (1) the squinting eye may be so defective in vision (amblyopic) that it does not fix readily, or it may fix eccentrically; (2) the angle of deviation may be so small that the movement of the eyes is difficult to detect; and (3) the child may be too young and/or too inattentive to keep his gaze fixed on the light.

Apart from deciding whether a squint is present or not, it is important to determine, if possible, the state of the vision in each eye. If the child is not old enough for his vision to be tested by means of Snellen's test types, or by the illiterate "E" test, or by picture test types, then some idea of the visual acuity may be obtained by investigating, by means of the cover test, the capacity of the child to fix with each eye.

The ocular movements should be examined in all directions of the gaze to determine if there is any limitation of movement, which may be suggestive of an ocular palsy, or if there is any excessive movement, which may be suggestive of overaction or contracture of a muscle. The pupils and their reactions should also be examined, and the eyeballs as a whole, both externally and ophthalmoscopically.

Before discussing the line of treatment to be recommended in any case of squint, let us consider why a squint develops in a child.

Convergent Squint

Paresis or Paralysis

In some cases a child is born with a paresis or paralysis of one or more of the extrinsic ocular muscles. If this is so there is usually an obvious squint, either in all directions of the gaze or only in certain directions (depending upon the extent of the palsy) noticeable within the first year of life. One would of course expect the squint to be noticeable from birth, and indeed it may be, but in view of the fact that ocular motility is not fully exercised until the maculae are properly developed at about the age of 6 months the squint may pass unnoticed until after this age. This is especially true of those cases in which the squint is manifest only in certain directions of the gaze, binocular vision being retained in other positions of the gaze. In some of these cases the squint is more or less overcome by the adoption of a compensatory head posture.

A paralytic or paretic squint may also occur as an acquired condition due to a febrile illness—for example, measles. Surgical treatment is invariably required in cases of squint of paralytic origin.

Refractive Errors

Hypermetropia.—Although all infants are hypermetropic to a greater or less extent, on account of the relative shortness of the infant eyeball, in some

cases the hypermetropia is excessive. This may lead to over-accommodation in order to obtain clear vision. Over-accommodation tends to lead to over-convergence (since accommodation and convergence are synergic actions), and this may precipitate a convergent squint. Furthermore, even in the absence of excessive hypermetropia a squint of the "accommodational" type may occur owing to an incoordination of the functions of accommodation and convergence. In these cases the squint usually begins in an intermittent fashion and tends to start, as one would expect, at the age at which the eyes are beginning to be used for discriminating near objects—usually at about $2\frac{1}{2}$ to 3 years.

Congenital Myopia.—An infant born with a moderate degree of myopia may develop a convergent squint because he can only see clearly objects which are situated at close range. As all distant objects appear blurred there is no incentive for the child to straighten his eyes when looking in the distance.

Anisometropia and Other Dissociating Factors.—Gross difference in the refraction of the two eyes may be a predisposing cause of squint because it produces images of unequal size and clarity on the two retinae. This tends to make fusion difficult and may cause dissociation. In a similar way an artificially produced anisometropia, such as may be caused by the wearing of incorrect glasses, may precipitate a squint. Prolonged occlusion of one eye by temporarily dissociating the two eyes may also cause a squint to develop.

In general a child with a squint caused by a refractive error essentially needs that error to be corrected by means of a pair of glasses, although other treatment may also be needed.

Other Causes

These include psychological factors—for example, sudden shock—familial factors, and conditions which may lead to general lowering of resistance—for example, excessive fatigue or general ill-health, especially if a latent squint already exists. Although these factors should be dealt with, their removal may not of necessity have any effect on the squint.

Secondary convergent squint may occur owing to loss of vision in the squinting eye due to organic ocular disease.

Divergent Squint

Primary.—By far the largest number of cases of divergent squint begin in an intermittent fashion at the age of 3 to 5 years, or sometimes later, and appear to be due to some form of inherent neuromuscular incoordination. If untreated the squint tends to become more frequent and of larger degree and eventually it may become a constant squint. There are three main types: (1) those of the *divergence excess* type, in which the squint occurs when the patient is looking into the distance; (2) those of the *convergence insufficiency* type, in which the squint occurs when the patient is looking at a near object; and (3) those of a mixed type. Although orthoptic treatment may lessen the "attacks" of squint and considerably improve the condition, surgical treatment is usually needed to effect a cure.

Refractive Errors.—Uncorrected unilateral myopic astigmatism may be the underlying cause of unilateral divergent strabismus affecting the myopic eye. Uncorrected *bilateral* myopia manifesting itself in later childhood may cause divergent strabismus, usually of

the alternating type. This type of squint, however, is rarely encountered nowadays, although it was not uncommon in the days before the routine examination of the eyes of schoolchildren was carried out. The essential treatment in these cases is correction of the refractive error.

Paresis or Paralysis.—Weakness of the medial rectus, which may be due to a partial third nerve palsy, may be the cause of a divergent squint.

Secondary divergent strabismus may occur as a result of loss of vision due to organic ocular disease in the eye which is diverging.

Vertical Squint

In practically every case of vertical strabismus there is a paretic or paralytic cause involving one or more of the vertically acting muscles. It must be remembered that pure vertical strabismus is a rarity. It usually occurs in association with convergent or divergent strabismus, and for its cure operative treatment is usually indicated.

Treatment

Although from the foregoing description it might be thought that every case of squint can be fitted into a water-tight aetiological compartment, this is untrue, for in many cases of squint there are several aetiological factors present.

The full function of binocular vision is not developed until about the age of 3 years, the elaboration of this function and its further development continues until about the age of 5, and the complete "grounding" of the binocular reflexes is not achieved until about the age of 8. Thus in the early years of life a squint may be precipitated by some trivial obstacle, even if it acts only temporarily, as in the covering of one eye for a few days on account of an injury of, say, the eyelid—an obstacle which in the case of an adult with well-developed binocular reflexes would not have the slightest effect. Just as the bonds which unite the eyes physiologically may be rapidly broken, so, *provided that immediate treatment is given* to restore parallelism of the visual axes, they may be quickly reunited. But if the squint is left untreated, then the eyes tend to develop along dissociated lines and prolonged re-educative treatment may be needed to restore normality of physiological function, to say nothing of precise surgical treatment to restore normality of anatomy.

The eyes should first be examined under the full cycloplegic action of atropine (atropine drops or ointment of 1% strength should be used for both eyes twice daily for three days before the examination). The reasons for this examination under cycloplegic and mydriatic are (a) to examine the optic fundi and media and to exclude the possibility of a "secondary" squint—that is, a squint secondary to organic ocular disease; and (b) to determine the state of refraction and to prescribe glasses to correct relevant refractive errors.

Naturally, if an organic ocular lesion is found the treatment resolves itself into that of the cause. The prognosis then depends on the nature and site of the lesion. An operation may be required sooner or later if only on purely cosmetic grounds. Although this group of cases forms but a small percentage of the total cases of squint in children, the possibility of a squint

being due to organic ocular disease or to disease of the central nervous system must be born in mind constantly.

In the cases with refractive errors it is clearly useless to prescribe glasses unless they are going to be of some benefit. They may be of benefit because they overcome the squint, reduce the angle of deviation, or improve the visual acuity. It is a mistake, however, to adopt a complacent attitude towards a case once glasses have been prescribed, and the limitation of their benefit must be fully understood. Unless the wearing of glasses causes the squint to disappear and the eyes to function normally together (binocularly) at least half of the time, and this within a few days of wearing the glasses (this can be ascertained only by refined methods of examination), then it may be assumed that other treatment will be needed, and needed immediately. This, first of all, consists in occlusion of the normally fixing eye. Occlusion should be continued until the vision of each eye is equal as determined by testing with Snellen's test types or the illiterate "E" test, or by the picture test. (If the child is not old enough for these tests the occlusion should be continued until free alternation occurs.) In some cases atropine drops instilled into the usually fixing eye may be used for occlusion to make the child "use" the squinting eye. Atropine is, however, quite useless unless it reverses the squint.

When the vision of the eyes is equalized and the refractive error corrected the squint may disappear; on the other hand it may persist. In either case, provided the child is old enough to co-operate (usually not until the age of about 3), tests should be carried out (orthoptic examination) to determine the state of binocular vision. If *fusion* is present and the squint is not of large degree, orthoptic exercises alone (or with the assistance of glasses) may restore normal binocular functions. Such exercises should, however, not be undertaken for prolonged periods unless definite progress is being made. On the other hand, if the child is not old enough or if the squint is of large degree, *operation* should be carried out at once. If abnormal retinal correspondence is present orthoptic treatment may be able to overcome it and to restore normal binocular functions, although unless there are signs of this taking place after about two months it is wiser to proceed with surgical treatment, for once the visual axes of the two eyes are restored to parallelism there is always a reasonable chance, provided there is equality of vision, of spontaneous development of normal physiological functions. (It should be stressed that operative treatment often has to be performed in a series of stages and it should be persevered with until the eyes are straight in all circumstances.)

There is a small percentage of cases in which, in spite of occlusion and the absence of ophthalmoscopic abnormality, improvement of vision in the squinting eye does not occur. In these cases there is probably a congenital retinal lesion, or a lesion due to traumatic retinal haemorrhage at birth. Treatment consists in an operation for cosmetic purposes in early childhood.

In view of what has already been said about the development of the binocular reflexes it should be pointed out that if a squint starts at a very early age—for example, within the first few months of life—there is no need to operate immediately, but it is wise to do so before the age of 18 months to 2 years in order to give the child a reasonable chance of developing normal binocular vision.

The accompanying schematic summary gives the method of treatment recommended in any given case of strabismus.

Outline of Treatment for a Child with a Squint (Excluding Rare Cases Associated with Obvious Disease of the Central Nervous System)

Conclusion

It cannot be overstressed that the treatment of squint may be a prolonged and painstaking business. It entails careful preliminary examination and frequent visits to check progress. The surgical treatment of squint is not just one wave of the surgical wand. It may entail operative treatment in several stages. The restoration of comfortable binocular vision does not of necessity follow as a result of wearing correct glasses or of surgical intervention. Prolonged occlusion to equalize the vision of the two eyes and orthoptic re-educational exercises may be required. But—and this is the important point—if a squint is treated energetically and efficiently directly it begins, the prognosis is usually good, and, even if it is not possible in all cases to restore binocular single vision, it is possible in most cases to ensure that the child will grow up in possession of two useful seeing eyes, and, indeed, what is just as important, will grow up without the psychological disadvantage of being “cross-eyed.”

The Ministry of Health is drawing attention to certain possible changes in prescribing. Hospital quality cotton-wool, which has the same absorbing power as the B.P.C. wool, but is not so white, should be prescribed whenever suitable, as it is less expensive. Unless hospital quality is specifically ordered, however, B.P.C. wool will be supplied. When prescribing elastic hosiery practitioners should specify on Form E.C.10 which of the ten kinds available is required. Prescribers are also reminded that when replacement of a complete colostomy belt or suprapubic belt is needed they should state on Form E.C.10 that a complete outfit is required, otherwise the one part only will be replaced.

THE ADOLESCENT DELINQUENT BOY

A report on “The Adolescent Delinquent Boy” has been prepared by the Joint Committee on Psychiatry and the Law, appointed by the British Medical Association and the Magistrates Association. It complements the report on “The Unstable Adolescent Girl” published in 1946 (*Journal*, December 14, 1946, p. 909). The report is summarized below.

More Delinquency Now

The committee found that the problem of adolescent crime was one of great complexity. There has been a steep rise in the incidence of adolescent delinquency in the last 10 years, and the committee thought it probable that there had been a parallel increase in the number of undetected adolescent offenders. The war would appear to have been a major factor, for it led to widespread disruption of family life, and the committee thought it probable that there had been a parallel increase in the number of undetected adolescent offenders. The war would appear to have been a major factor, for it led to widespread disruption of family life, and the committee thought it probable that there had been a parallel increase in the number of undetected adolescent offenders. The war would appear to have been a major factor, for it led to widespread disruption of family life, and the committee thought it probable that there had been a parallel increase in the number of undetected adolescent offenders.

The committee was especially impressed with the need for the guidance of parents and for the prevention, early detection, and correction of disharmonies in the home. The committee felt that ministers of religion can and should play their part in explaining to young engaged couples the meaning of the marriage service and in discussing the responsibilities of marriage. It is also important for the doctor, and especially the family doctor, to play his part in explaining not only the physical side of marriage, but, from his knowledge of the family, to give helpful, friendly, and experienced advice.

It is important that the delinquent who is not likely to respond to any form of treatment should be recognized at an early date after conviction. There is need for thorough research in the problem of the persistent offender, and some new form of treatment or preventive detention may be necessary.

Bad Homes

Many adolescent delinquents come from homes where conditions are unsatisfactory, and which are overcrowded, inadequately furnished, and neglected. In such a home there is no privacy and no sense of ownership—beds are shared, clothes are shared, the chest of drawers is shared. There is little home life and little opportunity for play. Thus from early childhood the boy is driven into the street, where he is in danger of joining a “tough gang.”

There are some particularly bad homes which produce a number of delinquents far in excess of the general relation of delinquents to non-delinquents. Thus a large number of delinquents may come from a small number of “criminal homes,” especially in neighbourhoods where moral standards are low. On the other hand some boys from homes of good standard become antisocial because of unfavourable psychological or environmental influences.

The proportion of delinquents who come from broken homes where the parents are divorced, legally separated, or living apart, or where some degree of matrimonial disharmony exists, is high. The boy is often unhappy and insecure. The Legal Aid Act of 1949 enables some of those in matrimonial difficulties to make a free or an assisted application to the High Court for divorce, if it is found that there are sufficient grounds, and there is likely to be a heavy increase in the number of divorce decrees, a fact which will probably have serious consequences to adolescents and children. This state of affairs is all the more serious because, so far as is known, no system has been created whereby those in matrimonial difficulties can receive social help before their cases are examined from the legal point of view. Social help before legal aid is of inestimable value.

In cases of parental disharmony, whether the home is technically “broken” (i.e., where one parent is absent) or