THE ORTHOPTIC TREATMENT OF SQUINT

BY

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Considerable attention has been attracted during the past three or four years to the "orthoptic treatment" of squint. Under this title one includes not only the older and simpler methods of improving or maintaining the vision of the squinting eye (by correcting glasses, occlusion of the fixing eye, atropinization, etc.), but also, and more especially, the various methods of training the *desire* for binocular vision, where this is feebly developed or has lapsed from disuse, and of exercising the defective muscular movements of the eyes, which may be associated with squint. Much of the technique is well known and has been described previously, especially by Worth in his textbook on squint; but there are important improvements both in the instruments employed and in the methods used, which are of more recent development, and not so generally understood. This seems to be a suitable opportunity to indicate the general lines of such treatment as it is at present employed, and to give some idea of the cases in which it is likely to be of use. Much of the information has been obtained from the Orthoptic Department of the Royal Westminster Ophthalmic Hospital, which hospital, in 1929, was the first in this country to organize such a department.

GENERAL INDICATIONS

For satisfactory results to be obtained it is necessary to select suitable cases. There should be good fixation with the squinting eye, and, if the child is old enough to be tested, the corrected vision of this eye should not be less than 6/18. The child should be at least 3 years old, but under 7. Over this age results are much less favourable, though not by any means entirely, or uniformly, negative. All patients should have their refractive error almost fully corrected. The best results are obtained in convergent squint; cases with a vertical deviation in addition are less favourable, many of these not being true concomitant squints, but having a parietic element. Even in such cases, however, it is sometimes found that the vertical deviation disappears during treatment. Myopic divergent squints, which develop later in childhood, and which glasses alone have failed to cure, usually respond satisfactorily; the divergent squints which are not due to refractive errors, and which usually develop in infancy, are seldom benefited, probably because there is a very weak inherited desire for binocular vision. True alternating squints, also, are not very satisfactory for training for the same reason.

THE SYNOPTOPHORE

The instrument which is used in many of the orthoptic clinics in this country is the synoptophore, an elaborate development of the original amblyoscope, described and used by Worth. Like the amblyoscope, the synoptophore consists of two angled metal tubes, each with a mirror, set inside at the angle, to reflect the image of the picture, placed in the slot at the distal end of the tube, through a convex lens, set in the eyepiece, into the patient's eye. Each tube can be moved separately on the base of the instrument to suit any angle of squint. The angle of deviation can be read off on a scale attached to the base; vertical deviations can be read off on a vertical scale. An electric lamp, controlled by a rheostat to vary

the intensity of the light, is set inside each tube to illuminate the picture. In the most recent models, to provide additional interest for the child, there is a mechanism for showing specially prepared "moving pictures." One important difference between this instrument and the amblyoscope, or ordinary stereoscopes, is that an unimpeded view of the patient's eyes is obtained by the trainer, who is seated on the opposite side of the instrument. Special stress is laid on this, as it has been found that some 70 per cent. of squinters do not, at first, obtain binocular vision at the true angle of their squint, but get simultaneous vision, or even fusion, when the squinting eye is still squinting a variable degree, often 10 degrees. This deviation cannot be detected by instruments which are controlled by the patient himself, in which the position of the eyes cannot be watched, and if fusion training is started without true binocular macular fusion, the result is likely to be unsatisfactory, as the faulty habit of obtaining binocular vision with the eyes still squinting becomes harder to correct after it has been thus encouraged.

TECHNIQUE

The true angle of the squint must therefore be first determined. This is done by finding the position of the tube opposite the squinting eye, in which the corneal reflex from the light in the tube is exactly symmetrical with that in the fixing eye. The angle is then read off on the scale. Any vertical deviation is similarly measured by adjusting the tube vertically, and taking the reading on the vertical scale. If it is found that the child has simultaneous perception of pictures, such as a lion on one side and a cage on the other, while the squinting eye is still partially deviating, as can be determined by the position of the corneal reflex, and does not see both pictures at the same time when the one before the squinting eye is placed at the true angle of the squint (in which position it is thrown on the macula), then there is false binocular projection. This must be remedied, if possible, before further training with the synoptophore, or any exercises with an amblyoscope or various kinds of stereoscopes, can be undertaken. This is effected by making the patient fix a well-illuminated picture with the squinting eye. While all his powers of concentration are focused on this picture, the tube containing the picture before the other eye is slightly moved rapidly from side to side, varying the illumination if necessary, until he gradually becomes able to appreciate both pictures nearer and nearer the true angle of the squint, and finally is found, on the instrument, to have true binocular projection, with the pictures accurately focused on each macula.

When this stage has been reached exercises are carried out to develop this true binocular vision under more difficult conditions of illumination, by varying the intensities of the lights, until the patient ultimately sees both pictures simultaneously under all conditions of illumination. The contrast between the pictures can be similarly varied. The pictures used with the synoptophore, as with the amblyoscope and various stereoscopes, are of three classes: (1) Those which require simultaneous vision only, and no fusion—for example, a lion on one picture and a cage on the other. (2) Those which require some sense of fusion to make a complete picture—for example, a man in one picture with arm and leg missing, these parts being supplied, with some parts common to the first picture, by the second. (3) Those which require a sense of perspective—true stereoscopic vision, which is necessary for the most accurate judgements of depth and distance.

Having developed good simultaneous perception the trainer shows pictures of the second group, and, when

good fusion has been obtained under all conditions of illumination and contrast, the range of fusion is increased by slowly moving the tubes through smaller or greater angles, until the limit has been reached at which the picture still continues to be seen as a whole. When a good range, or amplitude, of fusion is present, it is usually possible for the patient to have a sense of perspective, and this is trained and developed by pictures of the third group.

RESULTS

The cure is complete when the child has become so desirous of this good vision, and the muscles, by the exercises, have been strengthened sufficiently to enable him to overcome the deviation owing to this unconscious or conscious desire, that he habitually ceases to let one eye squint. Many patients, of course, do not attain this ideal, and others require operation. If it is found that good binocular vision can be obtained while the patient has the strong stimulus for such vision, which is supplied by the interesting pictures shown him on the various instruments, but that, under normal conditions of life, the squint still persists, operation should be undertaken at the earliest possible age, to approximate the visual axes more nearly to normal. The desire for fusion, already shown to exist, will then overcome any slight imbalance that may still be present. Such operations are preferably done before the age of 7, and must then be performed under general anaesthesia, when one cannot so accurately control the result of the operation as under local anaesthesia. Hence it is only in cases in which useful binocular vision is expected to result that one should operate under general anaesthesia and hope to gain perfectly satisfactory results. However, when an "inferiority complex" is developing in a young child, or even in the mother, as the result of the squint, an operation may be undertaken, even without such expectation, in order to improve the appearance of the child. Except in such cases, purely cosmetic operations should be left until the child is old enough to have one carried out under local anaesthesia.

After operation undertaken for the purpose of obtaining binocular vision, a few further exercises should complete the cure of the squint. If the operation is delayed until 7 years of age or more, the prospects of such a complete cure are remote. No treatment session should be continued too long, or the child will lose interest; half an hour is the limit. The exercises may be varied by using other instruments, once the "binocular projection" is true. The cheiroscope, with which the fingers are used to draw pictures, to pick up various objects, etc., while the child is being unconsciously educated to use both eyes at the same time, is a useful variant, as also are the ordinary stereoscopes and the "drawing" stereoscope; these can be used for home training. To improve the action of individual muscles or groups of muscles another apparatus, the myoculator or the myoscope, may be used. A double picture, requiring fusion, is projected on to a screen, and moved backwards and forwards in any required direction.

The time taken for such training varies considerably. Forty sessions are frequently required, sometimes more, sometimes only twelve. Considerable patience on the part of the trainer is obviously required, and the necessary skill can only be obtained under competent instruction. For practical reasons such treatment is frequently impossible, but there is no doubt that it is of great benefit in suitably selected cases, and that its recent development in hospitals and private clinics has proved of considerable service to ophthalmology.

EPIDEMIC JAUNDICE IN NORTH LEICESTERSHIRE

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Outbreaks of infective jaundice are comparatively common in Britain, and have been reported on from time to time.

Cockayne¹ (1912) described two types of the disease. The more severe form he styled "infectious jaundice" (the so-called Weil's disease), and the other milder condition "epidemic catarrhal jaundice." In the severe type Inado and Ido² (1915) discovered *Leptospira icterohaemorrhagiae*. *Leptospira* were found by Elliott and Beattie³ (1932) in the Selkirkshire epidemic. Buchanan⁴ (1927) obtained leptospira in the urine of seventeen cases, and produced spirochaetal jaundice in two guinea-pigs by inoculating them with the urine of infected patients. Morgan and Brown⁵ (1925) were unable to demonstrate this organism in the cases they investigated in Northamptonshire. No causal agent was identified in the Surrey epidemic by Findlay, Dunlop, and Brown⁶ (1931).

The symptomatology in these and other British epidemics did not greatly vary, and it would seem that such epidemics are manifestations of the one disease, although a spirochaete or other organism could not be constantly demonstrated.

An epidemic occurred in Castle Donington, North Leicestershire—a country town of 2,674 inhabitants—in the eight months from February to September, 1933. Forty-five cases were identified as acute infective jaundice—twenty-four by me and twenty-one by my partner, Dr. W. H. Dowell. This article deals exclusively with the former twenty-four cases—twelve of each sex.

With the exception of two, all affected persons were children. There were no deaths.

The condition has been frequently described, and it is not proposed to give the records of individual cases. Two, however, are of interest, as they were characterized by manifestations of unusual nature.

The course of the disease, except in these two instances, varied but slightly from that described by other recorders: anorexia marked the onset, and generally this was associated with lassitude, and sometimes with prostration and a feeling of weakness in the lower limbs. Two children complained of giddiness. As a rule fever was slight or absent. Either constipation or diarrhoea was evidenced. Vomiting occurred in all except three cases, and lasted for several days. From three to seven days after the initial symptoms, and from two to three after the onset of vomiting, bright yellow jaundice appeared and quickly spread over the body surface, persisting for a period which varied with the severity of the individual attack. A boy of 4, it is interesting to note, complained of "seeing green." The tongue was furred, and the abdomen occasionally distended. Pain and tenderness were common in the epigastric region, the tenderness being greatest towards the duodenal side. The faeces were clay-coloured in every instance, dark motions intervening from time to time. Enlargement and tenderness of the liver were observed in several cases, and in two patients the spleen was increased in size. Bile was always present in the urine, and remained for long periods after the jaundice had disappeared. Albumin and urates were generally found. In only two cases was the urine examined bacteriologically. The microscopical examination of centrifugized deposits, made at the Leicestershire county laboratory, showed no *Leptospira icterohaemorrhagiae*, but there