Sunshine is the second great weapon, real if possible, artificial if this cannot be obtained. In the early stages of treatment great care is necessary to avoid an overdose; this care cannot be relaxed until pigmentation has developed strongly. It is well to proceed by gradual stages—shade-light, sky-light, sunlight, and to expose small areas of the body at first and for ten minutes at a time only. It is not necessary to concentrate the rays upon the abdomen; sunlight produces general effects upon the body which are of greater importance than its local effect upon the seat of disease.

In the cure of abdominal tuberculosis in children we can do much by the removal of hindrances to recovery such as intestinal putrefaction and absorption of poisons, but good results are to be expected only through the natural reparative properties of the child's tissues aided by complete rest and careful sunning.

**ERRORS OF REFRACTION, WITH SPECIAL REFERENCE TO SQUINT.**

**BY**

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The remarks which I am about to make on the subject of errors of refraction are directed to those who are already in general practice, and I shall confine myself as much as possible to points of which students text-books say little. It will be convenient if the matter is considered according to the various periods of life, taking first infancy and then the succeeding decades.

**INFANCY.**

Most children at birth are hypermetropic, that is to say, the eyeball is small and rays of light entering the cornea, instead of being brought to a focus on the retina, are focused behind the retina, and the image formed is indistinct. By the fourth or fifth month development of the eye has progressed, the child begins to fix objects for more than a few seconds, the eyes are often parallel, and binocular vision is being acquired. At this time there may be occasional squint in a lateral plane, but not in a vertical plane. This may be neglected unless it is observed to be a constant squint, or at any rate of frequent occurrence. In such a case it is important that an accurate estimation of the refractive error should be made by retinoscopy, and that if there is hypermetropia a suitable correction should be ordered. If there is hypermetropic astigmatism found, the astigmatism should certainly be corrected; but it is of the first importance that the examination should be carried out by one who is both expert and in the habit of prescribing glasses. Glasses may be worn without the slightest difficulty in many children of 5 or 6 months of age, and if there is difficulty it must be overcome by patience and subtlety on the part of the mother and the nurse.

**CHILDHOOD.**

In the absence of any squint, errors of refraction are not usually manifest until the child is 5 or 6 years old. Also a squint may not develop until that age or frequently even later. When the child begins to play with small toys it may be noted, in cases of myopia and hypermetropia, that he brings the object within five or six inches of the eyes. This should make evident the necessity for ophthalmic examination. Again, the occurrence of redness of the lid margins, or blepharitis, is evidence to the same effect.

If hypermetropia is present in childhood there is a tendency to convergent squint, for the child, in order to focus properly distant as well as near objects, must exert accommodation to allow the lens to become more convex, and bring the parallel rays of light to a focus on the retina; it will be remembered that in the normal emmetropic eye parallel rays of light, in the absence of accommodative effort, are brought to a focus on the retina. With efforts of accommodation there is always a corresponding amount of convergence, and if an abnormal amount of accommodation is used, an abnormal tendency to convergence of the two eyes is produced, and if the desire for fusion of the images in the brain is not very strong, an actual convergence or squint is produced. The earlier the abnormal accommodative efforts are made, the more tendency there is to the development of squint, as at an early age fusion of the images from the two eyes has not been learnt.

Divergent squint is usually associated with myopia. It is probably generally developed when the child begins to go to school. He brings his book closer to the eyes than is convenient for his converging power in order to obtain clearer vision; it rests him to close one eye which diverges.

The disfigurement caused by a squint is considerable, but far more important is the great deterioration of vision which may occur in the squinting eye. The disfigurement may be diminished or cured in some cases by wearing the proper glasses, with or without operation; but the deterioration of vision if it once occurs is often permanent, unless special measures to prevent this are taken. This condition is known as amblyopia. In order to prevent amblyopia, we may entirely occlude the good eye, so as to make the patient use the squinting eye, or we may be less drastic and diminish the visual acuity of the good eye by the daily instillation of atropine, which fixes the eye in adaptation for distant vision.
So in all squinting eyes we first estimate the refraction by retinoscopy under the influence of atropine ointment applied twice a day for a week, and order the suitable glass about one dioptrre less than the retinoscopy result, and make the patient wear the spectacles, keeping him for a time under the atropine. If the squint is cured, nothing further need be done except to insist on the importance of wearing the glasses all the time, while the refraction should be re-estimated at least every two years, as changes usually occur as development proceeds.

If the squint persists, the effect of occluding the good eye or atropinising it may be tried. The question of operation will naturally be considered. If there is reason to believe that the squinting eye is amblyopic, it may be better to defer operation until the child is old enough to have the operation carried out under local anaesthesia, for then the exact amount of effect can be obtained that is required; this is not the case under any conditions of general anaesthesia. If there is no reason to suppose that the squinting eye is any worse than the other, or if in babies the squint is marked and is not improved with the correcting glasses, it may be advisable to operate early under general anaesthesia, in the hope that when the eyes are made parallel the child will learn to fuse the two images, and will obtain binocular vision. This in many cases is assisted by the regular use of Hamblin’s stereoscope, or of the amblyoscope. These instruments are designed for the purpose of teaching a physically perfect but amblyopic eye to take its proper share in vision.

**YOUTH.**

If the patient is seen for the first time at the age of 10 to 14, the first thing to do is to estimate by retinoscopy the refraction under atropine. If there is hypermetropia the fullest possible correction is ordered with which the patient gets good vision, astigmatism if present being fully corrected. If the patient is myopic the full correction is ordered. In those cases which exhibit a developed squint the principles already enunciated should be followed.

When examining the refraction, the accommodation should be paralysed with atropine sulphate drops 1 per cent., or atropine alkaloid ointment 1 per cent., used twice a day for a week, in all cases up to 25 years. It is sometimes necessary to make exceptions to this rule in the case of young men and women who are unable to afford the time during which atropine lasts; these may be examined under the less powerful drug homatropine. To obtain complete cycloplegia or paralysis of accommodation in a young adult it is usually sufficient to instil the 1 per cent. solution of the sulphate three times a day for three days. The effect may, however, remain in some degree for a week or a fortnight, during which it is impossible for the patient to do any near work unless he borrows a pair of plus four convex lenses.

Homatropine mydriasis and cycloplegia is obtained by the instillation four times at intervals of a quarter of an hour of a drop of a solution containing homatropine hydrobromide 2 per cent., and cocaine hydrochloride 2 per cent., and then waiting half an hour. This is the method which is recommended for all ordinary patients who are more than 25 years of age. After retinoscopy the patient is tested subjectively with the lens or combination of lenses indicated, and numerous variations tried. Besides testing the patient with the usual Snellen test-type, it is important to have some form of astigmatic test; the best of these is a revolving white disc on which are two circles, one with horizontal black lines, and the other with vertical black and exactly similar lines. When the astigmatism has been corrected there is no difference to be detected in the blackness of the lines on the two circles, as in astigmatism is always the case. In all cases it is advisable to examine the patient again, when the effect of the cycloplegia has worn off, and to order the glasses. It must be remembered that great care must be taken to get the cylinder of the exactly required strength, and at the correct axis, while the patient is under the cycloplegic, as this must on no account be altered when the patient comes up for the post-cycloplegic test. At the last visit it is of the greatest importance that while wearing the correction which is going to be ordered the muscle balance should be tested. This is done with a Maddox rod (demonstration given). The tests must be for both a distant and a near object. Without this the refractionist’s work is only half done, the importance of recognising hyperphoria and correcting it, where it is found to be necessary, being generally recognised.

The only contra-indication to the use of the combined mydriatic and cycloplegic is the presence of glaucoma or a tendency to glaucoma. The signs of glaucoma which are especially to be looked for previous to using a mydriatic are, a shallow anterior chamber, a sluggish acting pupil, increased intraocular tension, and cupping of the optic disc. However, if homatropine is used for all people over the age of 25, and if in every case after the examination under homatropine one drop of a solution of eserine alkaloid in castor oil ¼ per cent. is used there is no danger. If after the first drop of homatropine the patient developed a sudden attack of acute glaucoma, the exhibition of the above-mentioned eserine would abort it usually.

In my opinion it is important that every case which comes to the ophthalmic surgeon for refraction should be completely examined. This cannot be the case if spectacles are ordered without dilating the pupils. If this is not done the following points if present may be missed: posterior synechiae, pigment on the lens capsule significant of previous inflammation of the iris, opacities in the lens at the periphery which may depend on septic absorption from teeth, tonsils, &c., opacities in
the vitreous, the result of focal sepsis or of old hæmorrhage, as well as various pathological conditions at the periphery of the fundus. However, there is no great objection to ordering a presbyopic correction for a patient with 6/6 vision in each eye, provided the patient is given to understand that for his convenience the examination has been curtailed. However, I rarely do this in private.

ADULT LIFE.

Squinting patients who come under observation during adult life occasionally gain binocular vision, when the vision is good in each eye, after a successful operation has been done. More usually the squinting eye is permanently defective or amblyopic, and operation is done for cosmetic reasons only.

The variety of operation to be performed must be left to the surgeon to decide in accordance with his experience, and according to the condition of the eyes in each case. Whether advancement alone, or advancement combined with tenotomy, which may have to be performed on both eyes, is to be done, or whether the muscle is to be set back as regards its attachment to the sclera, a recession or retirement operation must depend on the case in hand.

THE CONTINUOUS WEARING OF GLASSES.

I wish to say a few words as regards the question which is often asked by patients: "Must I always wear my glasses?" It is necessary to discriminate as to the different types of case in answering such a question.

It is clear that patients who merely require a presbyopic correction for reading not only need not, but should not, wear their glasses for the distance. In all cases of ametropia a correction by means of lenses, either spherical or cylindrical or both, is required to enable a clear image to be formed on the retina of external objects without exercising undue strain on the ciliary muscle. This correction is adapted for use for both near and distant objects, provided the mechanism of accommodation is in proper working order, the patient being under 40 years of age. In cases of hypermetropia and astigmatism, where there are no headaches or other sign of ocular fatigue, and in which the muscular balance is unimpaired, the glasses may be discontinued intermittently as desired; but in those cases where there is headache or other disability the glasses should be worn continuously. In the case of ladies who, for cosmetic reasons, are averse to wearing glasses continuously, I sometimes say, "There are 24 hours in the day, during which about 8 are spent in bed, where certainly you are not required to wear glasses. This leaves 16 hours, which are certainly not all spent in society, the majority being spent at home. If you wear your glasses during 10 or 12 hours of this time, it is possible that you may avoid any more eye fatigue, but remember that your eye will always require the addition of glasses to make it a perfect optical apparatus." In the case of young girls it is legitimate to tell them that if they will wear the glasses regularly while they are at school they may be able to discontinue them, partially or entirely, when they are a little older. I prefer to tell patients that the glasses, when worn discontinuously, should be put on for so many hours a day, rather than to tell the patient to wear them when reading. If persons with a still active accommodation are told to wear the glasses when reading, as is generally done, they get an entirely wrong idea of the condition of their eyes, and of the purpose for which the glasses are worn.

In cases of myopia different principles must be enunciated. It is of great importance that the full correction should be worn in all except the very low degrees of this kind of ametropia. If this is not done, there is a liability for the myopia to increase. With increase in the myopia there are many other unfortunate sequelae, such as fundus changes, including detachment of the retina. It is of the greatest importance to avoid these complications as far as possible by the prevention of undue strain, and the provision of the correcting glasses for constant wear.

When a patient is unfortunate enough to have an error of muscle balance in the vertical direction, or hyperphoria, which is corrected by a prism, it is absolutely necessary in most cases that the glasses should be worn constantly, and that the surgeon should see that the error is the same for both distant and near vision, as different prisms may be required for each.

CLINICAL CASES

AT THE

CENTRAL LONDON OPHTHALMIC HOSPITAL.

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Clinical evenings are held at the above hospital at 5 p.m. on the first Tuesday of every month, and last for about one hour and a half. They are open to post-graduate or under-graduate students. Each meeting is taken in turn by a member of the staff, and the cases attending are those selected by him from his clinic during the preceding six months. The proceedings open with a short lecture by the surgeon in charge of the cases. The latter are then distributed in the dark rooms with their notes and any drawings which may have been made of their condition, and the visitors are free to examine them as fully as they wish.