ECLIPSE BLINDNESS.

BY

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THE recent eclipse aroused widespread interest, and was viewed by all and sundry under exceptionally favourable circumstances. Though the newspapers warned their readers to look at the sun only through a piece of smoked glass or through an over-exposed photographic plate, it was only to be expected that a few persons should suffer injury to sight owing to neglect of adequate precautions of this kind.

I propose to describe two such cases. Since the condition is so infrequent, it may not be out of place to mention that it differs from certain allied injuries in that it is complicated neither by concussion nor electrolytic effect.

"The change is probably of a chemical nature brought about by a too prolonged concentration of the ultra-violet, chemical active rays in the retinal elements at the macula. Any damage from concentration of the heat rays is probably prevented from a reduction in their potency by passing through the refractive media."

The characteristic symptom is the presence of a central scotoma. When closely examined the clinical picture reveals a certain complexity of composition.

CASE I.

On April 8th, 1921, Mrs. N., a widow aged 42, not only watched the sun at intervals from about 8 until 9.30 a.m., when the eclipse was most complete, but also went to a neighbour's house, with her piece of glass, to which reference will be made presently, and looked again with her friends. Thus the total duration of exposure was about half an hour.

Dazzling and watering of the eyes ensued, but soon passed off; the principal disturbance of vision was most manifest on playing golf. When addressing the ball a shadow appeared behind it, making her feel quite dizzy, and causing her to miss her stroke. Towards the end of the week the patient noticed what she took to be double vision on glancing to the right. For instance, a chair appeared to have six legs. Whereupon she consulted Dr. Garden of Ovenden, who referred her for examination.

On examination on April 16th the vision in each eye was 6/12. The ocular muscles were normal. The red band of the Maddox rod running horizontally passed normally through the light, but the vertical red band appeared curved round the light. Upright parallel lines drawn upon a white card seemed to be bowed outwards. This metamorphopsia was present only in the right eye. The peripheral fields of vision were normal, but the right central field contained an absolute paracentral scotoma, and a relative scotoma extending from it to the blind spot. Within the relative scotoma, green objects appeared red, and vice versa.

Objective examination revealed no abnormal conditions, except 0.75 D. myopic astigmatism. The urine was normal. Slight eczema of the anterior part of the nasal septum did not suggest suppuration of the air sinuses. There were no signs of constitutional disease.

Two questions arise: first, how we are to account for the absolute scotoma being somewhat removed from the fixation point; and secondly, whether the angular interval suggests an optogram of the eclipse upon the retina.

The answer to both questions must lie in the nature of the retinal changes which have resulted from the trauma.

"Aubaret has suggested that when the natural reflex protective mechanism—contraction of the pupil, closure of the lids, etc.—fails in its object, each cell in the retina takes on its own defensive measures, which consist, as in unicellular organisms, in a withdrawal of its processes. If the injurious stimulus is extreme the retraction is permanent and the neuron chain is irremediably broken."

Aubaret's hypothesis, however, scarcely explains metamorphopsia; still less does it account for the peculiar character of the relative scotoma, within which a green or red object excited the sensation of the complementary colour. The colour of the piece of glass referred to was indigo blue. Its transparency permitted of 6/6 vision in diffuse daylight. On looking through it at the sun for fifteen seconds one felt quite dazzled, and on gazing at a

sheet of white paper afterwards a blue image appeared, which was gradually replaced from its periphery inwards by a yellowish image (successive contrast), which persisted for five minutes.

Facts relative to the contrast phenomena indicate that the "central connexions of the optic nerves, the activities of which must be regulated by the same laws as those determined from our study of the more lowly activities of the spinal cord," are concerned in their production. Again, displacement of the retinal elements by swelling to such a degree as to cause pronounced curving of the band of light in Maddox's rod test is inconceivable: if not of refractive origin it must depend upon inco-ordinate transmission or faulty interpretation of retinal sensation.

Sir James Mackenzie teaches that symptoms are altered reflexes.⁴ Is the metachromatopsia found in cases of eclipse blindness but another illustration of this law?

CASE II.

Mrs. B., aged 42, looked at the eclipse about a dozen times, each time for about half a minute. At first she used a blue glass from a trinket set (very similar to that used by Mrs. N.), but soon discarded it, finding it gave no protection. No ill effects were noted until evening. On commencing to darn stockings the strand of wool at the needle's point seemed indistinct, though the rest of the stocking could be seen clearly enough. The following morning, on closing the right eye, a bright image like the sun occasioned some discomfort, though it would fade to bluish-green and disappear in a few moments. During the first and second weeks the objects at any distance still appeared blurred when looked at fixedly with the right eye.

The patient consulted Dr. Beetham of Bradford, who referred her to my father, with whom I saw her on April 23rd. The right vision was 6/60 for a moment, then less than 6/60; the left vision 6/10 with glasses which corrected some mixed astigmatism.

The only objective sign of disease was a patch of old choroidal degeneration behind the right inferior nasal branch of the retinal artery. This was represented in the corresponding area of the peripheral field by a small relative scotoma.

An ill-defined relative scotoma for colours was located around the fixation point; within it red objects changed to green, and vice versa, when gazed at for a few moments. The patient volunteered this information spontaneously. There was no absolute scotoma.

The symptoms in this case, though characteristic, were less marked at the time of examination than those presented in Case I. The etiology of the old-standing lesion referred to remains obscure.

Diagnosis.

When there has been a definite prolonged concentration of the sun's rays upon the macula, and the typical scotoma is found, with possibly some ophthalmoscopic confirmation of retinal trauma, the diagnosis presents no difficulty. The right eye is much more commonly affected than the left, though the vision may be impaired in both.

The onset of retrobulbar neuritis may be coincident with an eclipse. Since there would seem to be varying individual susceptibility to strong light, which cannot be accounted for by differences in retinal pigmentation, it is not unreasonable to conjecture that in certain cases of eclipse blindness there may be a toxic element at work, a point of lowered resistance having been created by the harmful rays. This would account for the aggravation of symptoms some days after their initiation. Be this as it may, it is well to exclude disseminated sclerosis, blood diseases, suppuration in the nasal accessory sinuses, and other morbid conditions which are apt to produce central scotomata.

In measuring the scotomata I am convinced of the truth of Mr. Bishop Harman's contention that in this matter speed and accuracy are synonymous; I therefore use a modification of his instrument.

Prognosis.

In giving an opinion as to the probable course of the affection the points to take into consideration are the duration of exposure to the direct rays of the sun, the degree of protection afforded by the coloured glass, if such were used, the severity of the subjective symptoms, and the extent of any lesions revealed by the ophthalmoscope.

CASE I.—Chart of right visual field. There is an absolute scotoma near the fixation point and a relative scotoma extending outwards to Mariotte's blind spot.

The important fact, which will have come as a surprise to some of those who watched the eclipse with more enthusiasm than discretion, is that the resulting lesions may be to some extent permanent.

Treatment.

Regarding prevention of eclipse blindness, it is only necessary to repeat that the force of the direct rays of the sun, even when its zenith-distance is comparatively great, is very apt to be underestimated.

Once the damage has been sustained rest is the chief essential, as in all other injuries. In recent cases confinement to bed in a darkened room, a shade over the eyes, or protective glasses should be ordered, according to the severity of the symptoms. Miotics may be helpful. Various authorities recommend tonics, especially strychnine, others advise potassium iodide. Faradism is also suggested during the later stages. If the eye is ametropic, the refraction should be corrected, and Crookes's lenses prescribed. Any systemic affection likely to lower ocular immunity should be met by appropriate treatment.

Conclusion.

I have one final observation to make in relation to the symptom I have named metachromatopsia: I define it as that state of vision which imparts to an object a colour contrasting with that which it excites in a normal eye. Its presence in the central part of the visual field, in cases of eclipse blindness, signifies disturbances of the normal reflexes connected with colour vision, resulting from harmful stimulation by strong light.

This is simply a working hypothesis, put forward with the justification that:

"It is easier to evolve truth from error than from confusion."
Lord Bacon.

ADDENDUM.

Professor Whiddington of Leeds University kindly furnishes the following report with regard to the optical properties of the sample of blue glass:

"I should hardly have thought that there was any great transmission of extreme ultra violet light through glass of this nature, but I will settle the point by getting a photograph showing the absorption spectrum in the visible and ultra violet regions. One would expect the red end of the spectrum to be cut off completely, and perhaps an absorption band in the yellow-green region, and then again complete darkness in the extreme ultra violet. Since the eye is more sensitive to visible light in the yellow-green than to any other, one might expect damage to be done to the eye perhaps if the sunlight of this colour were not sufficiently strongly absorbed."

REFERENCES.

¹ Treacher Collins and Mayou in *Pye's System of Ophthalmic Practice*. ² Aubaret, A "d" O., xxvii, 1907, cited by Parsons in *The Pathology of the Eye*. ³ Starling, *Human Physiology*. ⁴ Mackenzie, *BRITISH MEDICAL JOURNAL*, 1921, vol. i, p. 147.

THE TREATMENT OF URETHRAL STRICTURE.

BY

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URETHRAL stricture is one of the most difficult of surgical conditions to treat, and this perhaps accounts for the fact that so little has been done to modernize its treatment. This is well shown by the extraordinary paucity of papers which have been written on this subject during the last ten years; moreover, most of the papers that have been written only repeat old views and theories and add nothing to our knowledge.

The accepted teaching seems to be that urethral strictures are best treated by instrumental dilatation; this method, as we are all well aware, has been most disappointing, and that for many reasons—firstly, the difficulty of the operation; secondly, the long convalescence; thirdly, the pain produced; and lastly, the great frequency of recurrences unless the patient returns weekly, monthly, or yearly for the passing of sounds. The next method to be adopted in cases of failure by dilatation due to the stricture being impermeable or intractable is that of external urethrotomy. The same tendency to relapse follows this operation. The third method is internal

urethrotomy, but of this many surgeons seem afraid because of the excessive bleeding and extravasation of urine which follows the operation, and we might add the tendency to recurrence.

The greatest advance in the treatment of urethral stricture was made by Otis, who taught that dilatation should not cease with the passage of a No. 12 sound, but should be continued up to No. 20 or 24 (English measurements). He clearly showed that the normal male urethra will allow the passage of sounds of this size, and that it was due to the insufficiency of the dilatation that strictures relapsed whatever had been the method of treatment adopted.

This new doctrine did wonders for the treatment of urethral strictures, but still two drawbacks remained: the first was the pain involved and the length of treatment required in the passing of sounds, and the second was the length of stay in bed, and, after external urethrotomy, the difficulty of keeping the patient dry.

The new methods which I advocate are, I believe, a step forward, and certainly curtail the length of treatment, avoid all unnecessary pain, and keep the patient dry and comfortable in bed.

Unless a stricture can be easily dilated with sounds, or unless it is impermeable or does not allow of the passage of a No. 1 (English) catheter or sound, I believe that the correct treatment is internal urethrotomy. If the case is one in which this operation is indicated the internal urethrotome is passed into the urethra after the usual antiseptic precautions have been taken, and gas and oxygen are administered; the knife is then uncovered and the instrument withdrawn, and a number of previously oiled sounds passed into the bladder until a No. 20 or 24 is passed. The best instrument is Lockwood's modification of a Civiale's urethrotome. This enables any stricture to be divided from behind forwards, provided a No. 1 (English) bougie can be passed. I have now performed twenty-five operations of this nature, and have not had a single recurrence. Most of the cases have been seen six months after the operation, and a large proportion two years after. The after-treatment is simple. A catheter No. 20 is tied in for two days. A sound is passed once weekly for two weeks and then monthly for two months, and then after a year's interval. There has been no excessive haemorrhage or extravasation of urine, no rise of temperature, except occasionally to 99° F. at night, and no death.

Should the case be one in which external urethrotomy must be performed, the method I advocate is the complete suture of the urethra and skin after the performance of the operation. Such a method has, as far as I know, never been suggested before, probably because of the fear of extravasation of urine. I do not pretend that all cases can be dealt with in this way; strictures extending over a large extent of the length of the urethra cannot be so treated, but all others not complicated by abscesses or sinuses can. Out of a series of thirty-one cases of external urethrotomy I have performed this operation in twenty-five; of the remaining six, four were operated on several years ago. As soon as the No. 20 catheter is passed into the bladder the edges of the urethra are brought into contact by a continuous catgut suture passed through the muscles and tissues of the bulb, but not through the urethral mucous membrane. All oozing from the bulb now stops. The skin is sutured, and a small drainage tube left in for twenty-four hours.

I have seen no rise in temperature other than to 99° F. in a few cases. I have had no extravasation of urine, and with the exception of two cases early in my series in which urine passed through the wound for a week and ten days respectively, every case has healed by first intention.

In my opinion the operation saves so much pain and inconvenience, and so much loss of time, that I cannot imagine why it should not come into common practice. In only two cases has the patient been in bed for more than eight days.

A LABORATORY for mycological research has been founded at Oporto under the direction of Professor Froilano de Melo.

In Marseilles 4 per cent. of the school children are affected with trachoma, which has been introduced by labourers from North Africa.