

## DETECTION OF GLAUCOMA IN GENERAL PRACTICE\*

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At the International Congress in 1950, Conrad Berens read a paper by himself and C. P. Tolman to the International Association for Prevention of Blindness, on "The Prevention of Blindness from Glaucoma". In the course of this he suggested that the most effective approach to the problem would be through the medical profession rather than by propaganda, a view with which I think we should all agree. The need for a crusade against glaucoma is shown by some figures quoted in the paper: the Philadelphia Committee for the Prevention of Blindness found that, of 10,500 adult workers over 40 years of age, 280 (2.7 per cent.) had undiagnosed ocular hypertension and that only four out of the whole group knew that they had glaucoma.

It seems that in some respects to take the estimation of intra-ocular pressure as the criterion for presumptive diagnosis of glaucoma is open to criticism. First, the application of a tonometer demands a certain amount of skill and practice. It is also time-consuming, a factor of some importance to the present-day general practitioner. Secondly, owing to the well-known diurnal variations of intra-ocular pressure, quite a number of cases of mild chronic glaucoma may have a normal tension at the time of examination. This fact is recognised by ophthalmologists and it has become the custom with many when encountering a case showing signs of glaucoma with a normal tonometric reading, to admit him or her as an in-patient for periodic estimations every 2 or 4 hours over a period of 1 or 2 days. Thirdly, certain people seem to have an abnormally high tension, even up to 40 mm. Hg, without any deleterious effect on the eyes over a period of years.

There would seem therefore to be a need for some other test which would be simple and inexpensive to apply, as well as reliable. The detection of an arcuate scotoma seems to be the most important single observation to be made in the diagnosis of early glaucoma, especially as such a scotoma can sometimes be present in cases showing a normal peripheral field. Admittedly, such a scotoma is not irrefutable evidence of the presence of glaucoma and I have twice seen one produced by blockage of one of the small arteries going to the macula, but such cases are rare and in any event, if picked up during the course of general practice, should be sent on to the ophthalmologist. Very occasionally, one comes across a case in which there is ocular hypertension with loss of nasal field but no arcuate scotoma, but such cases are

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very rare and I can remember seeing only one in the course of some 30 years' work. In this case, the lamina cribrosa must have been pretty tough, because it showed no trace of cupping, in spite of a tension of  $+2$  to fingers and the loss of a quadrant in the upper nasal field. I do not wish, however, to enter into a discussion about the mechanism of production of an arcuate scotoma except to say that a pre-requisite is some degree of cupping of the disc, even though this may seem not to exceed physiological limits.

If, then, it is accepted that detection of an arcuate scotoma (or only the beginnings of one as shown by an area of defective vision near the fixation point and usually in the vertical meridian) is the most useful single test for glaucoma, how can one best set about detecting it, in the circumstances of general practice? Some form of Bjerrum screen would be the ideal, but this is neither practicable nor necessary, because all the examiner requires at this stage is to establish the presence or absence of a scotoma; more detailed examination will be carried out later by an ophthalmologist.

The schoolboy trick of a cross and a dot on the back of an envelope, which shows the existence of the blind spot, will be remembered by many.

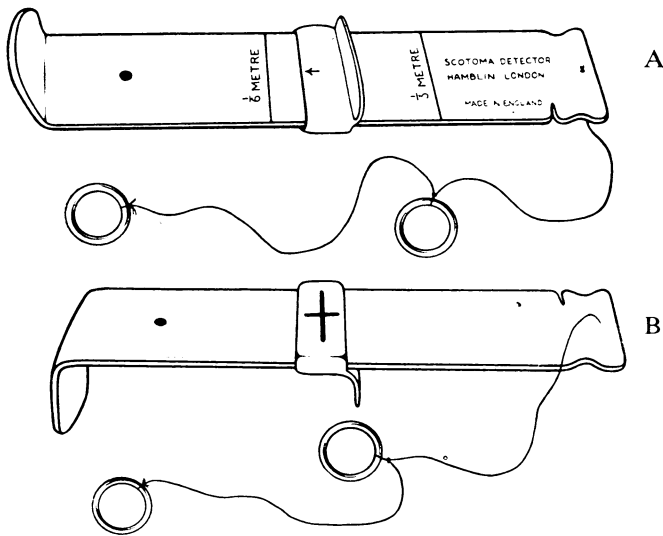


FIGURE.—Scotoma Detector.  
(a) Surface which faces examiner.  
(b) Surface facing patient.

The test I had made is derived from this and consists essentially of a white bar about 15 cm. long, with a black dot, 3 mm. in diameter, at one end and a cross on a movable cursor (see Figure). At the end of the bar opposite to the dot is attached a cord 33 cm. long, knotted at the end, with a small notch above the attachment. On the back of the bar are two transverse lines marked 1/6 and 1/3 m.

When the instrument is to be used, say on the patient's right eye, he is instructed to cover the left eye and the bar is held in front of him at a distance of 1/3 m.—as measured by the attached cord. Since the centre of the blind spot is  $15^\circ$  temporally from the fixation point and some  $7^\circ$  below it, the bar is inclined at  $7^\circ$  below the horizontal with the dot on the temporal side and the cursor as far from the dot as it will go. The patient is instructed to look at the centre of the cross and to notice that, although not looking at it, he is conscious of the dot. The cross is now slid slowly along and the patient is asked to say when the dot disappears and when it comes into view again. Contrary to what happens on the Bjerrum screen, success is usually achieved

at the first attempt, perhaps because the examiner is standing opposite the patient and can watch the movement of the eye (and also perhaps for another reason which I shall mention later). The existence of a blind spot being established, the bar is now held vertically and the manoeuvre repeated, first with the dot above and then with it below. If there is no scotoma, the dot does not disappear in either position, but if there is one it never fails to do so, at any rate in my experience.

In April, 1952, I saw a patient aged 49 with a large cup in his right disc and a typical scotoma below the fixation point. The scotoma showed up well on the instrument I have just been describing, the dot disappearing when it was below the cross but not when above. He came back 2 months later when I was at first disappointed to find that even with repeated trials the dot failed to disappear, but, on going over his central field on the Bjerrum screen to map out the scotoma again, I was surprised to find that as a result of pilocarpine drops it had disappeared. It looks therefore as though the instrument may be reliable, though I have not used it on enough cases to be dogmatic on this point. If desired, the test may be carried out at 1/6 m. by doubling the string and catching the knot in the nick, but this is seldom necessary. The lines on the back indicate the positions of the cursor at which the dot should disappear at 1/3 and 1/6 m. respectively, when it occupies the centre of the normal blind spot.

In presbyopes—and most of the potentially glaucomatous are in this category—it is as well for the patient to wear his reading correction though it is not usually essential. If bifocals are worn, one should make sure that the dot and cross are being viewed through the reading portion, otherwise the dot may seem to disappear when its image crosses the dividing line between the two parts of the spectacle lens. This is particularly liable to happen in the vertical meridian when the dot is above the cross and the patient is wearing bifocals which have a jump.

My experience with this instrument in which, to coin an Irish bull, the patient is fixing a moving object, made me wonder whether the same principle might not be applied to screen examination. Physiologically it is more natural for the eye to keep moving. Up to date, I have tried this only a few times and it certainly works, but I have not yet devised the best arrangement for doing it. I am waiting for a case of vascular hemianopia with sparing of the macula. Among the various theories accounting for this condition is that it is due to imperfect fixation, and if this is so, the sparing might not be so evident when the patient was looking at a moving object. In carrying out this method, the patient is directed to look at the target on the end of the holder which the examiner moves in the usual way, and to say when, what was formerly the fixation point, appears or disappears. A complication occurs in recording the scotoma or loss of field, because this has to be done so to speak looking-glass and upside down. This is not difficult when using

pins on the screen, however, because one puts them in at the diametrically opposite point to that occupied by the disc on the holder.

This however is not my main subject, at any rate at present, because what I wanted to describe was a quick and effective way by which the general practitioner could detect chronic glaucoma. The method is also useful for the ophthalmologist, particularly in those cases where there is doubtful cupping and one is pressed for time, as so often happens in hospital work.

I should like to thank the late Mr. Theodore Hamblin for his kind co-operation in producing this instrument, and his drawing department for preparing the Figure and supplying the block.

#### REFERENCE

- BERENS, C., and TOLMAN, C. P. (1951). "XVI Concilium ophthalmologicum, 1950, Britannia Acta", vol. 2, p. 1499.