

READING TEST IN GLAUCOMA*

BY

ALAN HIGGITT AND REDMOND SMITH

*From the Glaucoma Clinic, Institute of Ophthalmology, University of London
Director of Research: Sir Stewart Duke-Elder*

LITTLE attention has been paid to the effect of reading on the tension of the glaucomatous eye. The first brief reference to the subject is by Gradle (1931):

The reading test is still less likely to be positive (than the water-drinking test), but is of very definite value when it is so. The patient is told to concentrate upon any form of reading, preferably fine print at a close range, and the tension is then measured after forty-five minutes. When positive the increase in tension will seldom be more than 10–15 mm. Hg.

Several authors (Duke-Elder, 1940; Sugar, 1951) quote this paper but give no data of their own on the matter.

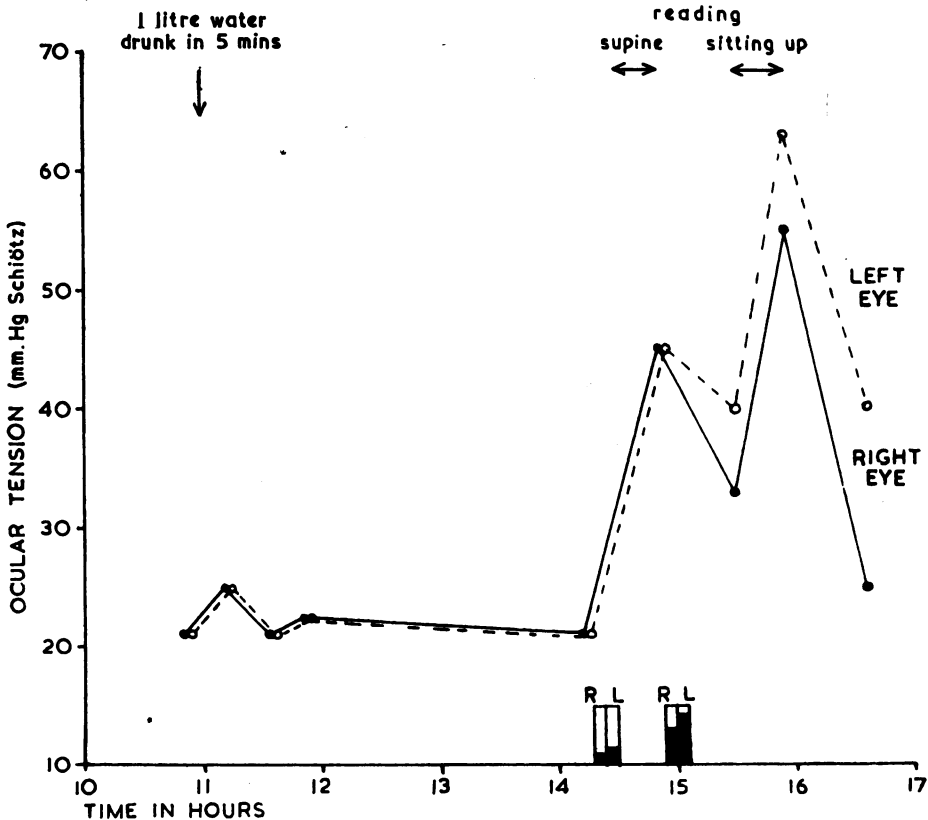


FIG. 1.—Case 1, showing change of tension during water-drinking and reading tests. Shading of rectangles adjoining base line shows extent to which angles of anterior chambers were closed by apposition of iris root to trabecula.

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Reading is a common occupation, so that this neglect of the reading test is somewhat surprising unless it be due to the rarity with which positive results are obtained. We have recently had the opportunity of studying two cases of glaucoma in which ocular close work, such as reading or sewing, brings on haloes; it is with these two patients that this report is concerned.

Case Reports

Case 1, a seaman aged 28, had had recurrent attacks of misty vision associated with rainbow haloes around lights and aching over the eye for the previous 4 years. The trouble had started with the left eye, but more recently the right had also become affected. These attacks occurred nearly every time he read for more than about a quarter of an hour. An intelligent man, he was unable to advance at all in his profession as all attempts at study were rapidly terminated by a sub-acute attack of congestive glaucoma. Visits to the cinema caused no symptoms and his attacks were relieved by a period of rest or sleep.

Apart from the condition of the angles of the anterior chamber to be described later, no ocular abnormality could be found on routine examination. Vision was 6/5 in each eye with insignificant manifest hypermetropia. The anterior chambers were of average depth, the discs were healthy, and the visual fields full.

Gonioscopy revealed narrow angles with a little ciliary band visible below. The angle of the right eye became very narrow from 9 to 11 o'clock, a corresponding but more extensive region in the left eye, from 1.30 to 4 o'clock, being closed by trabecular peripheral anterior synechiae. The angles differed from the usual appearance in cases of congestive glaucoma in which the iris is markedly convex and tends to assume a bombé

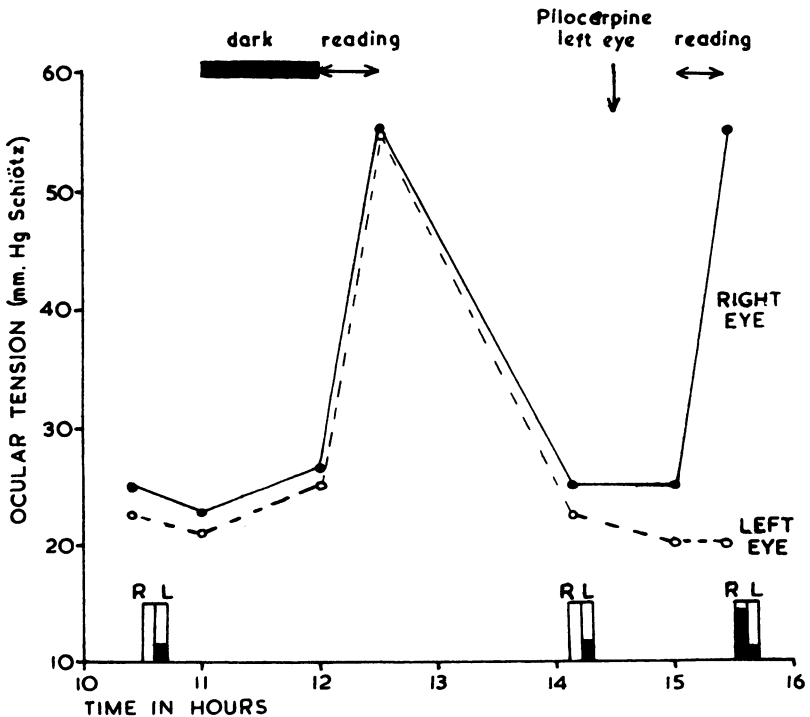


FIG. 2.—Case 1, comparing the effect of dark-room test and reading test, and showing inhibition of response to reading caused by pilocarpine.

form at the periphery (Chandler, 1952). Here the irides were noticeably more flat, the narrow neck of the sinus being due to an abrupt angulation at the root of the iris. No obvious change in the width of the angle could be seen on asking the patient to fix a near object. A slight "off/on" excursion of the iris root was present on switching the slit lamp off and then on again, but this excursion did not appear to be sufficient to cause complete closure of the angle.

When he was first seen the tension of each eye was normal, but it rose to pathological levels after as little as 20 minutes reading. The response to provocative tests is shown in Figs 1-3.

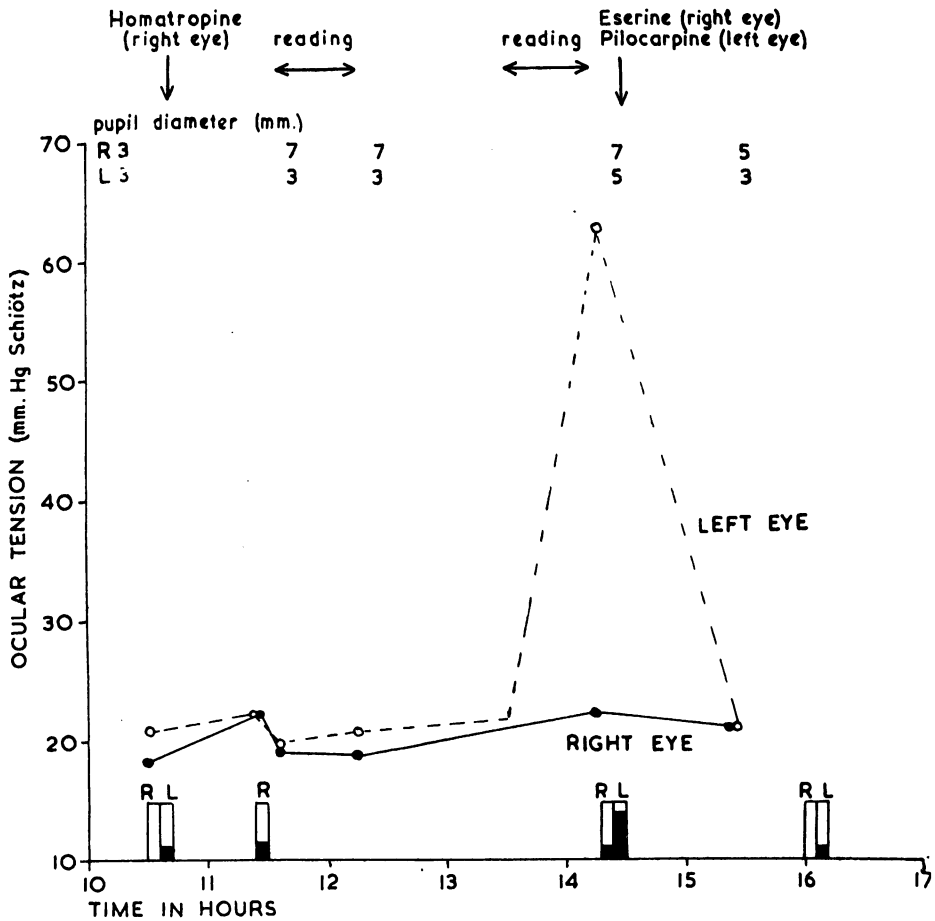


FIG. 3.—Case 1, showing effect of homatropine 1 per cent. instilled into right eye. At first reading for 45 minutes has no effect on either eye. Later the tension of the left eye rises after reading, that of the right remaining normal.

The salient features were that the dark-room and water-drinking tests were both negative, but that the tension of both eyes could be made to go up and down at will by alternating reading of average-sized print with just sitting quietly. When the tension went up a previously open angle was found to have closed. This rise of tension occurred whether the reading was done sitting up or supine, so it was not

caused by a dropping forward of the lens by gravity. The right pupil was dilated with homatropine; this closed the angle from 9 to 11 o'clock but the tension remained normal. Reading then had no effect on the tension of this eye although the left eye became hard. Miotics also prevented this unusual reaction to reading; indeed, the patient is now using pilocarpine 0.5 per cent. twice daily to each eye with complete relief of symptoms. Miotics were without effect on the appearance of the angles.

Case 2, a housewife aged 44, had experienced haloes and misty vision for 5 years in the left eye and for 2 years in the right eye also. These phenomena were brought on by any ocular close work such as reading or sewing, occurred at any time of the day, and were relieved by rest or sleep. Attacks were not provoked by visits to the cinema.

As with the first patient, routine examination disclosed no ocular abnormality. Visual acuity was 6/6 in the right eye and 6/6 partly in the left, with no significant refractive error. The anterior chambers were of average depth, the discs healthy, and the fields full.

Gonioscopy of the right eye disclosed an angle of medium width below, which became extremely narrow above, the iris almost touching the posterior trabecula. The angle of the left eye showed about 50 per cent. trabecular peripheral anterior synechiae, these occurred mainly in the upper half of the angle, but some were also present on either side of a medium and open segment below. Here again the irides were relatively flat at the periphery with no trace of the bombé tendency seen in cases of congestive glaucoma (Fig. 4). An "off/on" excursion of the iris root was present, but without complete closure of the angle. Accommodation revealed no apparent change in the angle.

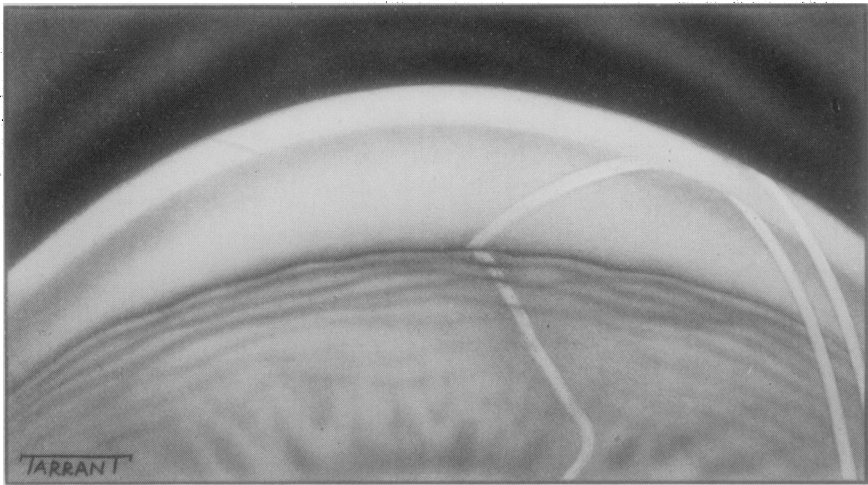


FIG. 4.—Case 2, gonioscopic appearance of right eye.

Without medication, the tension of the right eye was usually within normal limits; on occasion, however, it would rise to about 40 mm. Hg Schiötz. The tension of the left eye was more variable and was usually high when without medication. Water-drinking and dark-room tests had no significant effect on the tension.

Fig. 5 (opposite) shows the rise of tension after reading for 30 min. A similar result was obtained on several occasions, the tension rising after a period of reading and falling again while the patient was sitting quietly. The increased tension was associated with closure of the angle, the left one being almost completely shut when the tension

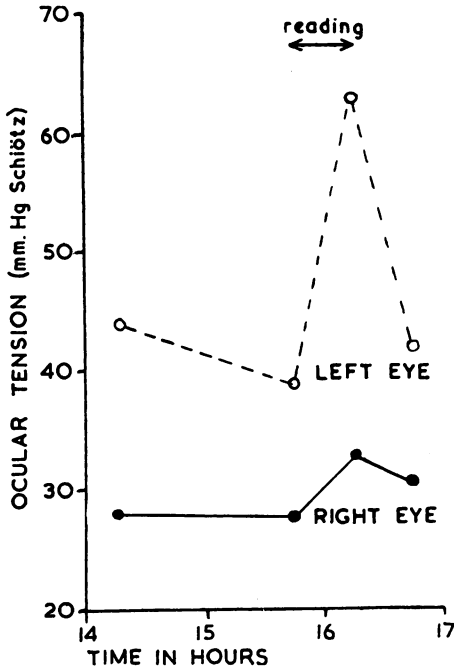


FIG. 5.—Case 2, showing change of tension when reading (unmedicated).

rose to 56 mm. Hg. The right eye behaved similarly, but only partial closure was observed as the tension went up.

Neither pilocarpine nor eserine could prevent haloes; indeed, on her early visits the highest tensions were recorded whilst she was using miotics, the lowest whilst not on treatment at all. In view of this and the negative dark-room test, treatment was instituted with mydriatics. As long as adequate mydriasis was obtained, the tension remained within normal limits and reading provoked no significant rise (Fig. 6).

This patient is at present using a drop of atropine 1 per cent. every morning to each eye. This necessitates a presbyopic correction but has been successful in preventing the haloes.

Discussion

How should these patients be classified? They have a type of episodic glaucoma, without regular diurnal pattern, in which increase of tension

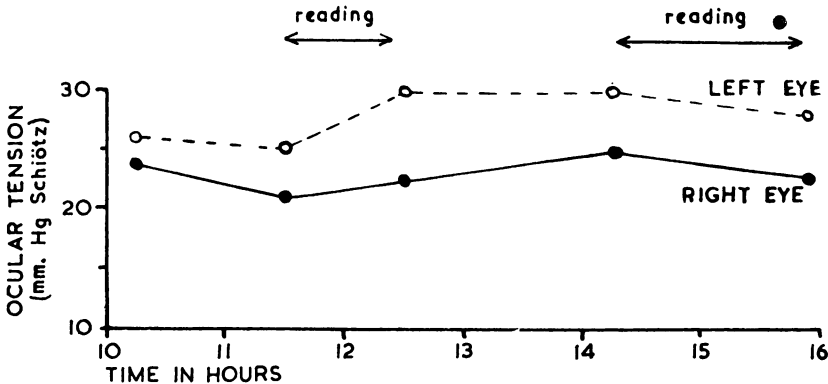


FIG. 6.—Case 2, showing effect of dilating both pupils by atropine; reading no longer has any significant effect on the tension.

appears to be due to closure of the angle of the anterior chamber. Thus they have the same immediate mechanical cause as the group of "narrow angle glaucoma" described by Barkan (1938). They are not, however, typical of the usual case of congestive glaucoma which has quite different precipitating factors, most of which would appear to act by causing a mydriasis, the dark-room test (Higgitt, 1954), visits to the cinema (Miller, 1953), the instillation of mydriatic drugs (Sugar, 1941), or emotional upsets being the

main exciting causes in such cases. The two patients described here respond to none of these, the only regular exciting factor being prolonged accommodative effort, whilst mydriasis reduces the tension to a normal level.

It is suggested that these differences in behaviour may reflect differences in the anatomy of the angles of the anterior chamber. There is no question here of a passive ballooning of the periphery of the iris. Even when the angle is closed by apposition of the root of the iris to the corneo-scleral trabeculae, the rest of the iris remains relatively flat. The appearance is as though an ectropion of the ciliary body had occurred through a rotation around the scleral spur. If this movement does indeed take place as a result of accommodation, it is a delayed effect as no immediate change could be seen when either patient fixed a near object.

The one really paradoxical feature is that pilocarpine controlled the tension of the first patient. Even when used in sufficient concentration to cause ciliary spasm the angle remained open and the tension normal. Yet accommodation when pilocarpine was withheld caused a rapid rise of tension.

Reading appears to be without effect on the tension of the more common type of congestive glaucoma. We have not studied this reaction on a large scale, but six patients with a marked response to the dark-room test showed no change of tension after intensive reading. An occasional positive response in this condition would be without much significance, as such patients are liable to spontaneous changes in tension which could well be precipitated by a visit to the glaucoma clinic.

The conclusion to be drawn from a study of these two patients is that closure of the angle of the anterior chamber in congestive glaucoma may in certain cases be effected by a change in configuration of the ciliary body. Such cases are in contrast with the more common variety, in which there is a change in the iris itself, such as ballooning due to pupillary block, or bunching due to pupillary dilatation.

Summary

Two patients suffering from an unusual type of congestive glaucoma are described. Accommodative effort, such as reading or sewing, was the precipitating factor, the tension being reduced to normal levels by mydriatic drugs. Miotics also controlled the tension in one patient, but were without beneficial effect upon the other.

Increase of tension was associated with closure of the angle of the anterior chamber. It is suggested that during accommodation a rotation of the ciliary body occurred about the scleral spur and that this caused apposition of the root of the iris to the corneo-scleral trabeculae.

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