Downloaded from http://bjo.bmj.com/ on July 6, 2017 - Published by group.bmj.com



# THE INFLUENCE OF AGE UPON THE AXIS OF ASTIGMATISM

BY

A. W. STIRLING, M.D., C.M.Edin., D.P.H.Eng., F.A.C.S.,

ATLANTA, GEORGIA.

FOR some years an impression has been growing upon the writer that there exists a definite relationship between age and the axis of astigmatism. This impression, which gradually grew into a conviction, was that the "rule" which says that the axis in hypermetropic astigmatism tends to be vertical, while correct for young people, is the reverse of correct for the elderly, and that therefore in middle age the axis takes a middle course. How completely this conviction is supported by the facts will appear in this paper. It is possible that this question has already arisen, and been examined and settled, but if so the fact has escaped the writer's notice, while a friend who recently was resident for three years in the New York Eye and Ear Infirmary, in which certain of the surgeons pay much attention to refraction, states that the conclusions which follow are entirely new to him.

About the year 1894, the writer, on a number of occasions, watched his friend, the late Dr. George Bull, in his consulting rooms in Paris at work on refraction cases, in which he took much interest. He was greatly occupied with the various causes of blurred vision, among them, of course, astigmatism; and I remember that he laid particular stress upon the influence of the "clignement" of the lids in producing at least temporary astigmatism, which would naturally be according to the "rule." He afterwards published two or three papers on this subject,* which I believe were well received by ophthalmologists. For instance, Parsons† says: "Perhaps the pressure of the lids on the globe tends to squeeze it above and below." The prolonged influence of lid pressure, if any—and the writer has always been sceptical in this regard—one would expect, however, to increase the astigmatism "with the rule," and even if the pressure may possibly diminish with age, that occurrence would hardly account for a change to astigmatism "against the rule."

To test the question the writer considered that the fairest method would be to take old cases as they came in his card system, using no diseased eyes, and to record them in tabular form. He began

* "Lid pressure on the cornea." *Trans. Intern. Oph. Congress*, Edinburgh, 1894, p. 107; and "Visual effects of refractive error," *Trans. Ophthal. Soc. of U.K.*, 1896, Vol. XVI. p. 200.

† "Diseases of the Eye," p. 52.

Downloaded from http://bjo.bmj.com/ on July 6, 2017 - Published by group.bmj.com



strictly according to that rule, but later modified it to this extent: he decided that one is more liable to error with the small degrees of astigmatism, and after having recorded a number of eyes with ·25D. and ·37D., he passed cases of these amounts, and noted only ·50D. and over. Later, as his time was limited, he decided to pass all ages between 20 and 50, of which he had already included a considerable number, and rather to stress the contrast between the astigmatism of the eyes under 20 with those over 50 years old. Except for these particulars, cases were recorded as they came in the cards.

It was at first intended to record a large number of cases, but as the task was somewhat wearisome, and could be done only at intervals, it was decided to stop, at least for the present, at 100 cases, or 200 eyes. The results, however, seem to be so clear and distinct, so far at least as the *plus* cases are concerned, that they will suffice for the purpose of bringing the subject forward for consideration by others. The myopic cases, only 23 in number, are too few to indicate anything definitely, but they may be taken up at a later date. The method pursued in the investigation was to mark on tables of ruled paper the number of the case, the age in decades, the amount and kind of the astigmatism, and the axis. The exact degree of the axis was not recorded, but the test frame was divided into sections of 15 degrees each, while the vertical axis (90 degrees) and the horizontal axis (180 degrees) had each a separate column. It was simpler to use a test frame in which the figures beginning on each side at the nose increased downwards to 90 and then upwards on the temporal side to 180, like the old English frame, and similar to the American in the left eye, but differing in the right. Four tables were employed: (a) Right eye with cycloplegic; (b) Left eye with cycloplegic; (c) Right eye without cycloplegic, and (d) Left eye without cycloplegic. The following is an example:

| R.E. with Cycl. | No. Case | Age in Decades | 90 | 90 to 75 | 90 to 105 | 75 to 60 | 105 to 120 | 60 to 45 | 120 to 135 | 45 to 30 | 135 to 150 | 30 to 15 | 150 to 165 | 15 to 0 | 165 to 180 | 180 | Amt. of Ast. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | x | | | | | | | | | | | | | | ·50 |
| | 2 | 3 | | x | | | | | | | | | | | | | ·75 |

The following is a summary of the observations made: The age of the eyes recorded turned out to be about one half under and the other half over 40 years, and in all except 3 cases (6 eyes) of the former the refraction had been done under a cycloplegic (2 per cent. homatropin and cocain sufficiently instilled). In the eyes over 40

Downloaded from http://bjo.bmj.com/ on July 6, 2017 - Published by group.bmj.com



(except one case, two eyes) no cycloplegic was used. It is considered unlikely that this difference had any material effect on the results obtained.

The average amount of the astigmatism of the plus cases was ·83 D. The point of interest which is brought out by the investigation relates to the gradual change in axis with advancing age. The so-called "rule" in astigmatism that the axis of a plus lens tends to be vertical is borne out by the figures of this paper so far as young eyes are concerned, but in elderly people they show the opposite to be the case. There appears to be, indeed, a slow turning of the axis from childhood to old age, but not decidedly either out or in, because the axis in oblique astigmatism runs down and out in 57 per cent. of the eyes, and down and in in 43 per cent.

If we place the eyes under 50 years old in one class and those above 50 in another, we find that in roughly 15 per cent. of the younger eyes the axis was nearer horizontal than vertical, and that it was nearer horizontal than vertical in 75 per cent. of the older eyes. Missing out decades I and IX in each of which there were only two eyes (vertical in the first, horizontal in the ninth) the respective percentages for the other decades from the second to the eighth, for axis tending towards the horizontal, were 10·6, 15·4, 23·0, 27·0, 56·3, 60·0, 83·3.

The average distance of the axis from the horizontal in each decade was measured by using the middle figure of each of the above-mentioned segments of 15 degrees each, which is close enough for our purpose. These distances were from the first to the ninth decades respectively:—

83·0, 75·4, 75·8, 65·6, 59·5, 39·8, 34·6, 26·3, and 4·0.

This paper has not been prepared with the idea that it is a final exposition of the subject, but rather in order to draw attention to it. The most conclusive proof that the axis turns with age would be provided by an examination of the same eyes at intervals through long periods of time, and probably most of the elder among ophthalmologists have noticed a change in the axis in many of their patients. Yet if further investigation does not contradict the above figures, the conclusion that the axis frequently tends with years to wheel from the vertical to the horizontal seems to be irresistible. The writer regrets that the number of myopic eyes supplies insufficient ground for any statement. It will make an interesting enquiry in connection with the present. Another point which remains to be definitely settled is whether the gradual change is entirely corneal, entirely lenticular, or a combination. I am inclined to think that it is corneal. The ophthalmometer would aid in settling the question.

Downloaded from http://bjo.bmj.com/ on July 6, 2017 - Published by group.bmj.com

# THE INFLUENCE OF AGE UPON THE AXIS OF ASTIGMATISM

A. W. Stirling

*Br J Ophthalmol* 1920 4: 508-510
doi: 10.1136/bjo.4.11.508

Updated information and services can be found at:
**http://bjo.bmj.com/content/4/11/508.citation**

*These include:*

**Email alerting service**

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Notes**

To request permissions go to:
**http://group.bmj.com/group/rights-licensing/permissions**

To order reprints go to:
**http://journals.bmj.com/cgi/reprintform**

To subscribe to BMJ go to:
**http://group.bmj.com/subscribe/**